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PRINTED IN USA
CINEFEX 100 - JANUARY 2005
CINEFEX is published quarterly at P.O. Box 20027, Riverside, CA 92516. Tel: 951-788-1917 Fax: 951-788-1793 URL: www.cinefex.com. E-mail: letters@cinefex.com / editorial@cinefex.com / advertising@cinefex.com / circulation@cinefex.com / website@cinefex.com. Printed by Valley Printers, Riverside, CA. Copyright © 2004 by Don Shay. All rights reserved. Reproduction in whole or in part in print or on the Internet, without written permission is prohibited.

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State of the ART

a cinefex 25th anniversary forum

EDITED BY JODY DUNCAN
INTERVIEWS BY DON SHAY & JOE FORDHAM

This is our 100th issue. A landmark by any standard, but particularly for a quarterly publication. To mark our 25th anniversary, we wanted to do something big, something memorable. After all, once you pass #100, there isn't another milestone of note until #200 — and, by then, all of us on staff hope to be well into retirement: spoiling grandchildren, pruning roses, joining Brian Dennehy aboard a spaceship... Anything other than producing a magazine every three months.

This milestone, then, is the last for us. What to do, what to do...?

After batting around some of the usual and, frankly, tired ideas — such as a retrospective on the 'best' effects films of the past 25 years — we hit upon what we thought was an interesting notion. What if we gathered a group of visual effects luminaries in one room for a penetrating roundtable discussion about the state of the art and the state of the business? And then published highlights from that roundtable discussion?

Cool idea. Almost at once, however, reality intervened. What were the chances, really, of getting all of the people we wanted together in the same room, at the same time — especially these days, when, at any given moment, effects artists are as likely to be in London or Prague or Vancouver as in Los Angeles?

Another idea sprang from the first. Since we couldn't get all of them to come to us, we would go to them, individually, and sit down for a series of long talks. We started by drafting a list of prime candidates. After years of conducting interviews with people in the industry, we knew who could be counted on to vent a bit, who would be open to a philosophical, rather than purely technical discussion, who had strong and thoughtful opinions about everything concerning movies and visual effects.

Our first list of potential subjects had more than 100 names. One hundred issues...one hundred effects artists. The symmetry was alluring. But, again, it was unrealistic to suppose that we could conduct that many interviews in a matter of a few weeks. So we began paring down the list — a painful process, because we knew that every name we cut would cost us valuable insights.

We reduced the list by half. As difficult as each cut was, when we got to the interviewing phase, we realized it was vital that we'd done it. Conducting even our 50-plus interviews in the time we had was an all-consuming endeavor. We wound up with about 80 hours of taped interviews, 79 hours of which were absolutely fascinating and well worth printing. Unfortunately, our calculators told us that to do that would require a 500,000-word issue — roughly the size of a long James Michener novel.

After transcribing all of the interviews — a job that took three staff members and two temporary hires more than two months to complete — we nipped, tucked, pulled out the very best of the material, and then pieced it together in a Q&A format that had the feeling of a roundtable discussion, which, in a sense, it was. It was just a very, very big roundtable, with a circumference intersecting Los Angeles, Sydney, Wellington, Paris, London and the Bay Area.

In the process of assembly, we felt the pain that filmmakers must when terrific material ends up on the cutting room floor. Mid-course, however — thank you, Quentin Tarantino — we realized that we could, and should, make two articles out of this material instead of just one. So look for our panel's insights into visual effects from a business perspective in our next issue. Other discarded gems will no doubt find their way into our online weekly newsletter.

So, here it is. Imagine a very large room, our very large table, and around it sitting some of the most prominent people in visual effects. (Yeah, yeah, they weren't really sitting around a table — we said imagine...)

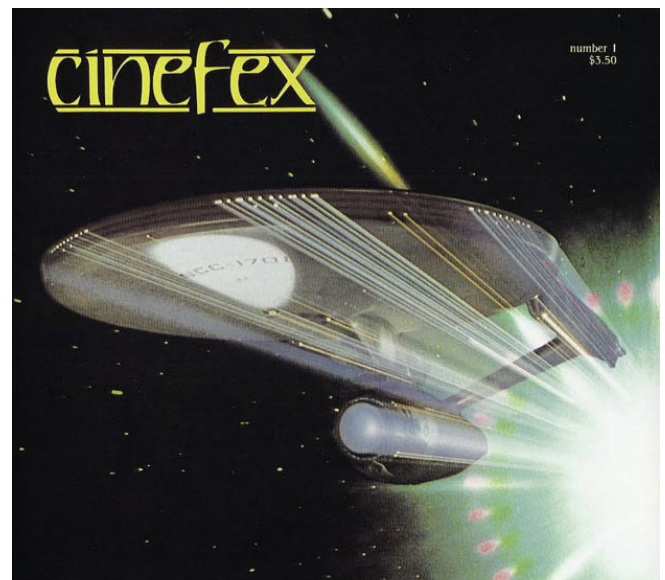
CINEFEX: There's been a digital revolution in the effects industry in the past ten or fifteen years —

JOHN VAN VLIET: I don't call it a digital revolution. I call it a digital tsunami. It came in, sucked everyone out to sea, and then the survivors washed back up.

CINEFEX: Are you surprised at how quickly that 'digital tsunami' swept through the film industry?

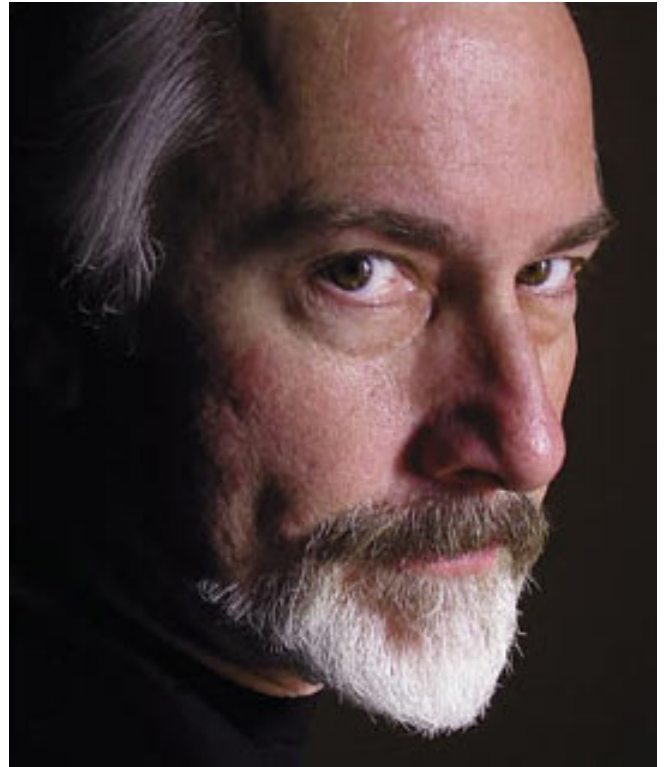
JOHN KNOLL: It was inevitable that it was going to happen. But how fast digital became the only thing is pretty remarkable. I did one of the first digital comps for a feature film — at least here at ILM — on *The Abyss*, the shot of the door closing on the water pod. At the time, I thought: 'This is the future. Five, ten years from now, we're going to be doing all this stuff digitally.' And a year later, you couldn't give optical compositing away. It happened overnight.

HARRISON ELLENSHAW: Actually, I was surprised that it took as long as it did. *Tron* was in the early 1980s; and at that time, I said: 'Five years from now, digital will have taken over all of visual imagery effects, and even the gathering of the image itself. Film will have pretty much gone away.' I was wrong. And the reason I was wrong was that *Tron* was not a commercial success. It



sunk — fast. So, instead of taking five years, it took ten years.

KEN RALSTON: In the public's mind, Jurassic Park is where it happened. But it really happened prior to that, at ILM, purely because George Lucas had a belief in the technology. Things happened there that I don't think people realized were huge — like the stained-glass man in Young Sherlock Holmes. Really, that scene is more important than Jurassic. You look at it now, it doesn't look like much of anything. But at the time? My God, those guys beat themselves up doing that. And by the time Jurassic finally came out, after years of CG in other movies, that was the showcase.



Rick Baker

MAKEUP EFFECTS CREATOR

Honed self-taught skills in low-budget horror films. Formed studio, now Cinovation, in 1981. Academy Awards: An American Werewolf in London, Harry and the Hendersons, Ed Wood, The Nutty Professor, Men in Black, How the Grinch Stole Christmas. Credits: Greystoke, Coming to America, Planet of the Apes.



Craig Barron

VISUAL EFFECTS SUPERVISOR

Formed Matte World (now Matte World Digital) in 1988, after eight years in matte department at Industrial Light & Magic. Oscar nomination: Batman Returns. Credits: Independence Day, Casino, Titanic, The Truman Show, Mighty Joe Young, Armageddon, X-Men, Jurassic Park III, Down With Love, The Ring, The Alamo.



Steve Begg

VISUAL EFFECTS SUPERVISOR

Started as a modelmaker on Gerry Anderson puppet shows in 1982, then worked in miniature visual effects with Derek Meddings and The Magic Camera Company. Credits: Batman, GoldenEye, Lost in Space, The Avengers, Lara Croft: Tomb Raider 1/2, The Brothers Grimm. Upcoming: Batman Begins.



Brooke Breton

VISUAL EFFECTS PRODUCER

Started career in television postproduction. Was associate producer on Star Trek IV/V/VI, co-producer on Sky Captain and the World of Tomorrow and producer on The Road to El Dorado. Served as senior vice president of production at Digital Domain, 1993-1996. Credits: Dick Tracy, Solaris, Master and Commander.



Eric Brevig

VISUAL EFFECTS SUPERVISOR

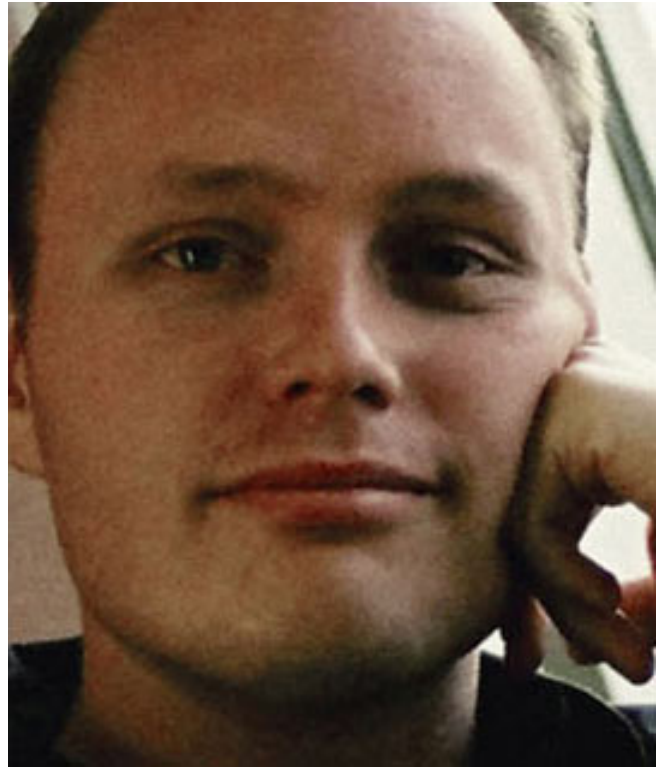
Joined Industrial Light & Magic in 1990, after seven years at Dream Quest Images. Academy Award: Total Recall. Nominations: Hook, Pearl Harbor. Credits: The Abyss, The Indian in the Cupboard, Men in Black I/II, Wild Wild West, K-19, Signs, Peter Pan, The Day After Tomorrow, The Village. Upcoming: The Island.



Matthew Butler

VISUAL EFFECTS SUPERVISOR

With graduate degree in aeronautics, joined Digital Domain in 1994, where technical training was applied in the development of custom animation tools incorporating natural physical dynamics. Credits: Apollo 13, Dante's Peak, Titanic, How the Grinch Stole Christmas, XXX, Fight Club, The Day After Tomorrow.



Stéphane Ceretti

VISUAL EFFECTS SUPERVISOR

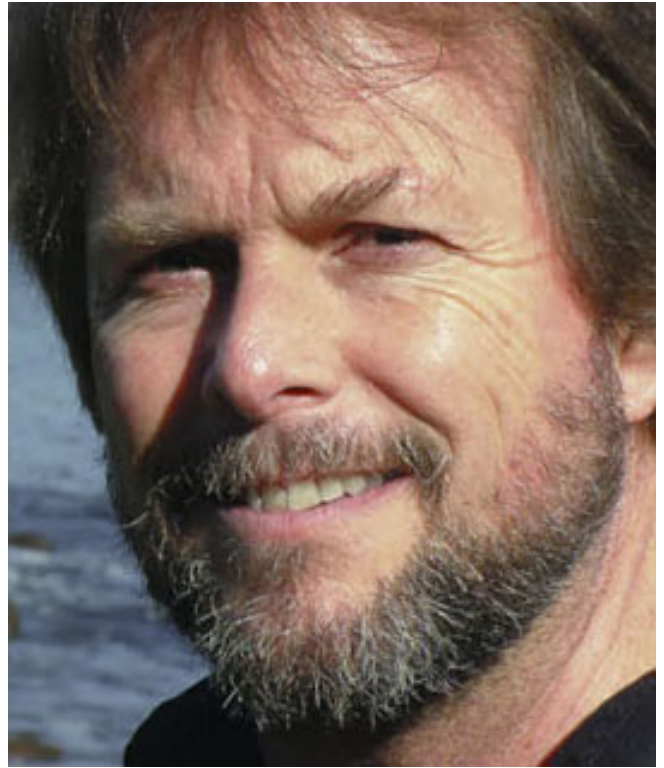
With a background in physics and the arts, started as a digital artist at Buf Compagnie in 1996. Worked on Batman & Robin and numerous television commercials before advancing to visual effects supervisor on The Cell. Credits: Simone, The Matrix Reloaded, The Matrix Revolutions, Alexander.



Rob Coleman

ANIMATION DIRECTOR

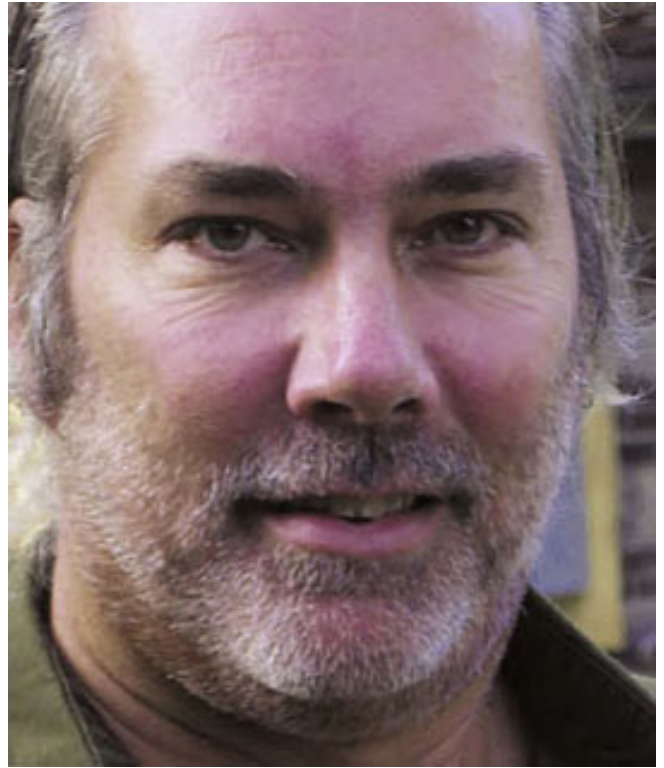
Joined Industrial Light & Magic in 1993, after working at the National Film Board of Canada and several small animation studios in Toronto. Oscar nominations: Star Wars I/II. Credits: The Mask, Star Trek Generations, The Indian in the Cupboard, Dragonheart, Men in Black, Signs. Upcoming: Star Wars III: Revenge of the Sith.



Randall William Cook

ANIMATION DESIGNER & SUPERVISOR

Started career as stop-motion animator on Laserblast, Q, The Thing. Director: Demon in the Bottle. Academy Awards: The Fellowship of the Ring, The Two Towers, The Return of the King. Credits: Caveman, Ghostbusters, 2010, Poltergeist II, The Gate. Upcoming: second-unit direction on King Kong.

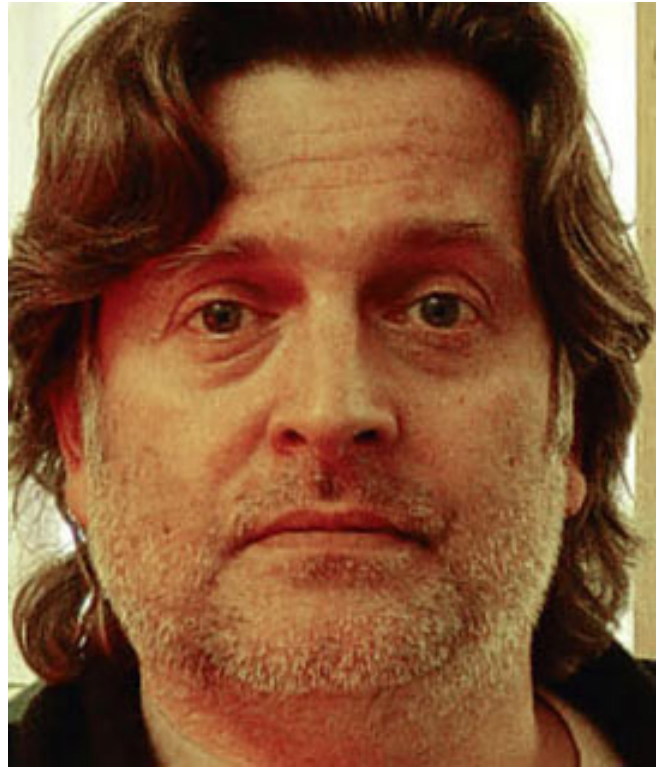


Jamie Dixon

VISUAL EFFECTS SUPERVISOR

Created some of the first digital film effects at Pacific Data Images, 1985-1995. Founded Hammerhead Productions — with Dan Chuba, Thad Beier and Rebecca Marie — in 1995.

Director: Bram Stoker's Shadowbuilder. Credits: Solar Crisis, Toys, True Lies, Titanic, Deep Blue Sea, Supernova, The Chronicles of Riddick.



Nick Dudman

CREATURE EFFECTS DESIGNER

Apprenticed with Stuart Freeborn, 1979-1983, and assisted Dick Smith on *The Hunger* before setting own course in makeup and creature creation. Credits: *Legend*, *Batman*, *The Fifth Element*, *The Mummy*, *The Mummy Returns*, *Star Wars I/II*, *Harry Potter 1-3*. Upcoming: *Batman Begins*, *Harry Potter and the Goblet of Fire*.



Syd Dutton

VISUAL EFFECTS SUPERVISOR

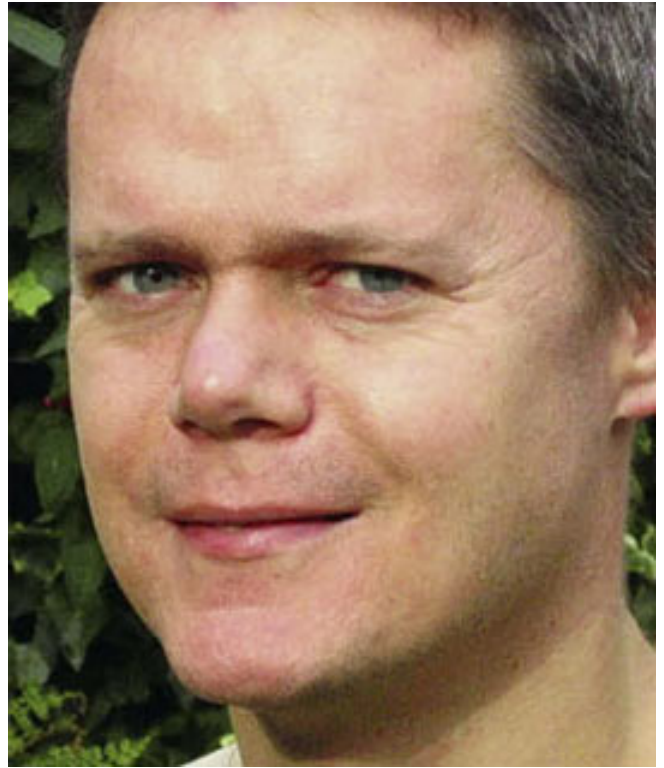
Mastered matte painting under Albert Whitlock at Universal matte department, 1977-1984. When Whitlock retired, founded Illusion Arts, with colleague Bill Taylor, in 1985. Credits: The Hindenberg, Dune, Glory, The Mask of Zorro, The Fast and the Furious, The Time Machine. The Bourne Identity, Van Helsing.



John Dykstra

VISUAL EFFECTS SUPERVISOR

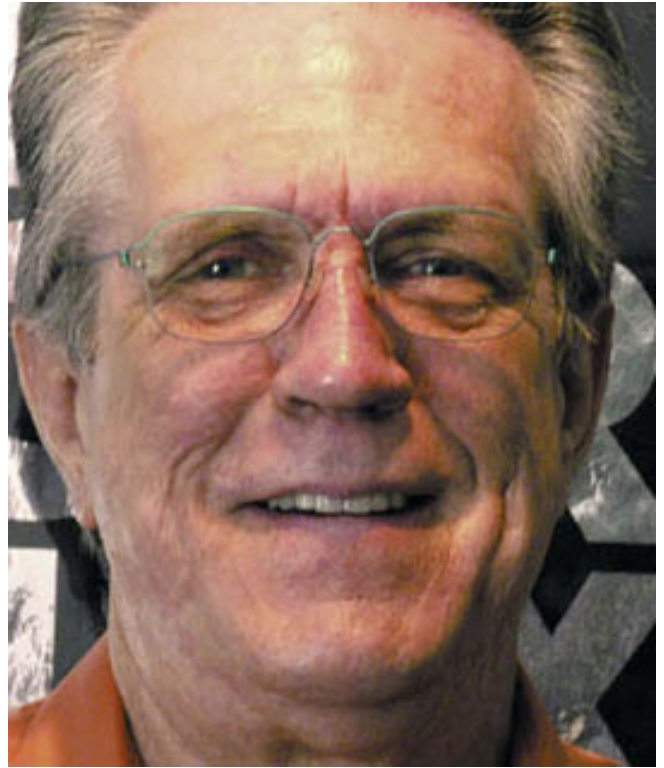
Started career with Douglas Trumbull. Chosen by George Lucas to launch Industrial Light & Magic and supervise Star Wars visual effects. With partners, formed Apogee, 1978-1992. Academy Award: Star Wars. Nominations: Star Trek: The Motion Picture, Stuart Little, Spider-Man. Credits: Batman Forever, Spider-Man 2.



Paddy Eason

VISUAL EFFECTS SUPERVISOR

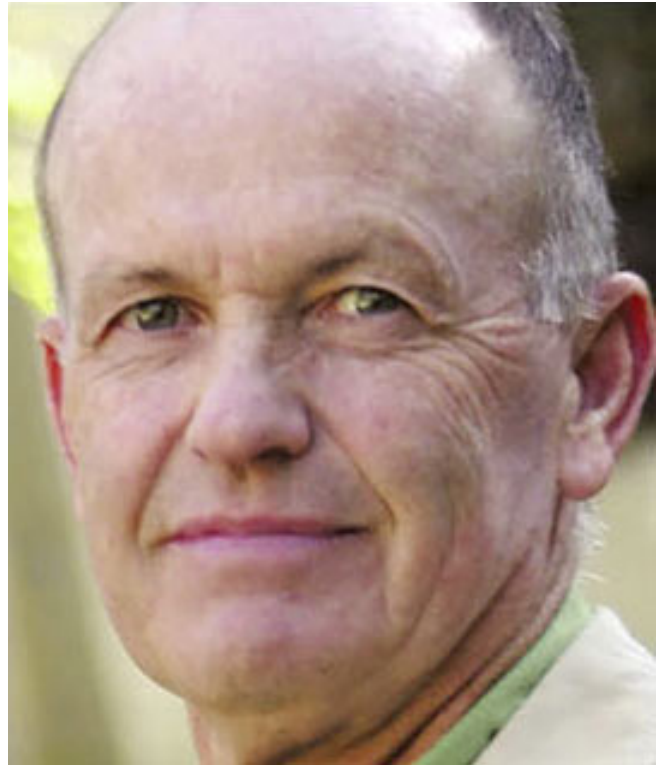
Advanced to visual effects supervisor at Computer Film Company, 1990-2000, then worked briefly at Double Negative before joining The Moving Picture Company in 2001. Credits: Mission: Impossible I/II, Sleepy Hollow, Chicken Run, Big Fish, Harry Potter 3. Upcoming: Wallace & Gromit: Curse of the Were-rabbit.



Richard Edlund

VISUAL EFFECTS SUPERVISOR

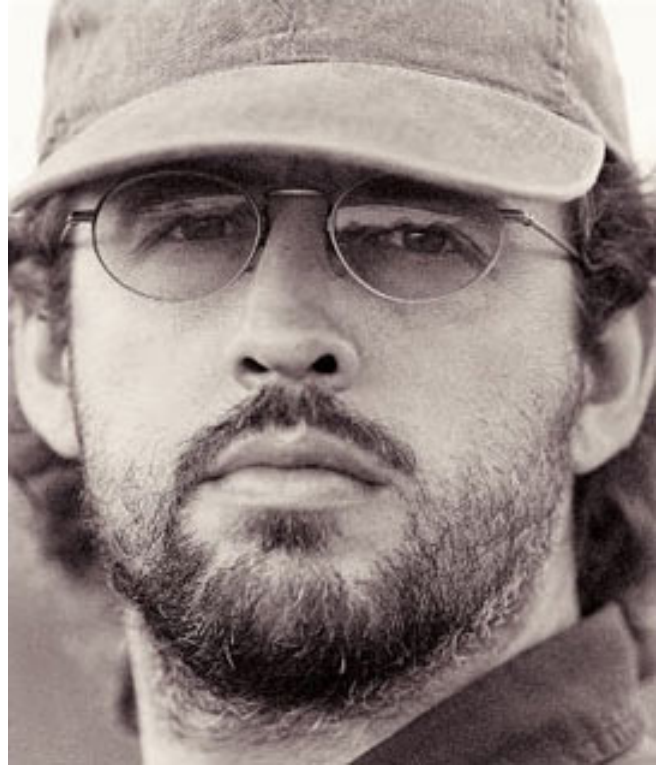
After years with Westheimer Company, Robert Abel & Assoc and ILM, formed Boss Film Studios, 1983-1997. Academy Awards: Star Wars, The Empire Strikes Back, Raiders of the Lost Ark, Return of the Jedi. Nominations: Poltergeist, Ghostbusters, 2010, Poltergeist II, Die Hard, Alien3. Credits: Cliffhanger, Multiplicity.



Harrison Ellenshaw

VISUAL EFFECTS SUPERVISOR

Joined Walt Disney Studios as matte artist, rising to matte department supervisor, 1974-1979. Moonlighted on Star Wars, then oversaw matte department on The Empire Strikes Back. Headed Buena Vista Visual Effects, 1990-1996. Oscar nomination: The Black Hole. Credits: Tron, Superman IV, Ghost, Dick Tracy.



Volker Engel

VISUAL EFFECTS SUPERVISOR

Started career in Germany on Moon 44 and Universal Soldier, then moved to the United States. In 1999, formed production company Uncharted Territories, with Marc Weigert, and effects subsidiary Dreamscape Imagery. Academy Award: Independence Day. Credits: Godzilla, Coronado, Kingdom in Twilight.



Alex Funke

VISUAL EFFECTS DIRECTOR OF PHOTOGRAPHY

After ten-year stint with Charles Eames, joined Universal-Hartland, then formed Precision Film Group, 1980-1982. Worked at Dream Quest Images, 1988-1992. At Weta since 2000. Academy Awards: The Two Towers, The Return of the King. Credits: The Abyss, Total Recall, Mighty Joe Young. Upcoming: King Kong.



John Gaeta

VISUAL EFFECTS SUPERVISOR

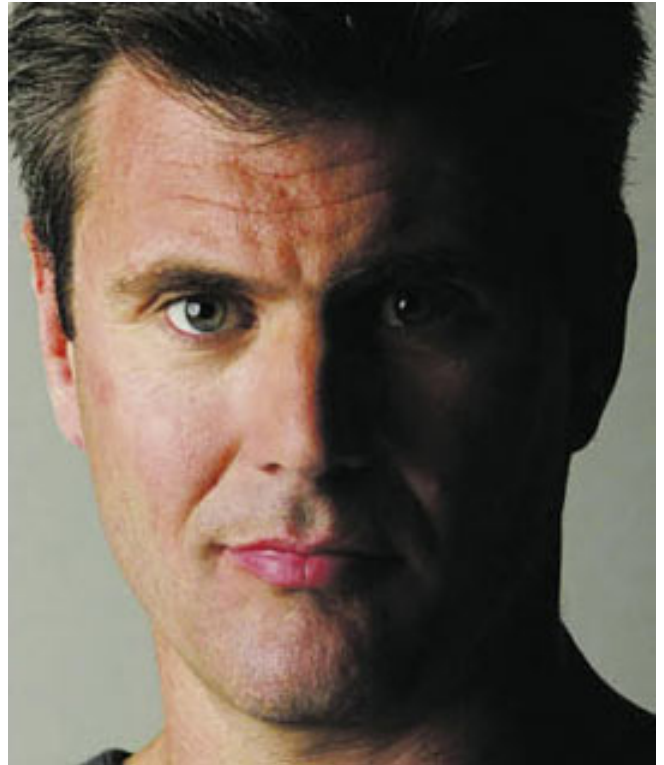
Worked on Back to the Future and Secrets of the Luxor Pyramid ride-film attractions created by Douglas Trumbull, then joined Mass Illusion before embarking on seven-year Matrix odyssey. Academy Award: The Matrix. Credits: What Dreams May Come, The Matrix Reloaded, The Matrix Revolutions.



Steve Gawley

MODEL SUPERVISOR

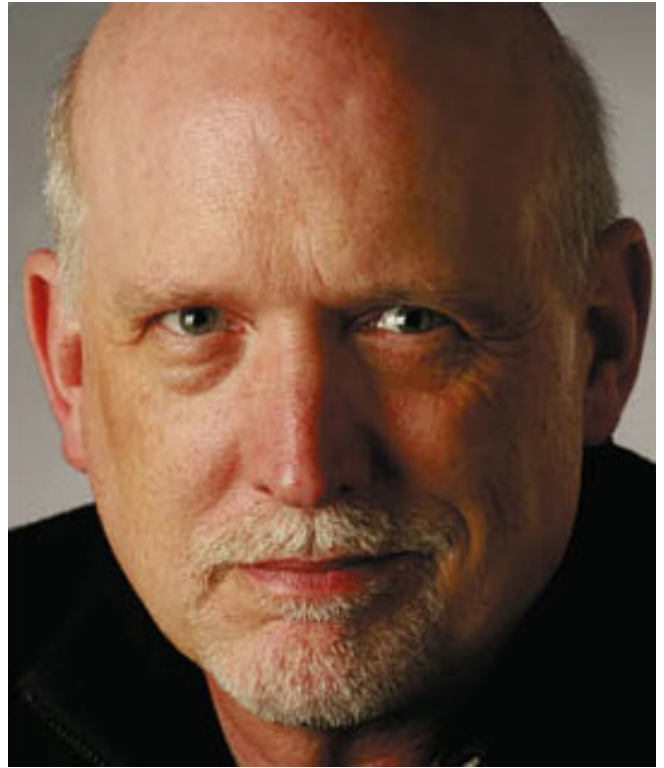
At Industrial Light & Magic since 1975. One of the original 15 visual effects crew members on Star Wars. Oscar nomination: Back to the Future II. Credits: Star Wars I-VI, Raiders of the Lost Ark, Back to the Future I/II/III, Jurassic Park, Mission: Impossible, Men in Black, A.I., Dreamcatcher, The Hulk, Lemony Snicket.



Alec Gillis

CREATURE EFFECTS CREATOR

Started as a modelmaker on Battle Beyond the Stars, then did makeup and creature work for Greg Cannom, Tom Savini and Stan Winston. Formed Amalgamated Dynamics Incorporated, with Tom Woodruff, Jr., in 1990. Credits: Aliens, Tremors, Wolf, Alien Resurrection, Starship Troopers, Spider-Man 1/2.



Ned Gorman

VISUAL EFFECTS PRODUCER

Started in show business as a stage actor. Joined Industrial Light & Magic in 1982 as a production buyer and advanced to visual effects producer. Credits: Ghost, Memoirs of an Invisible Man, The Abyss, Meteorman, Congo, The Lost World, Star Wars I, Pearl Harbor, Men in Black II. Upcoming: Son of the Mask.



Karen Goulekas

VISUAL EFFECTS SUPERVISOR

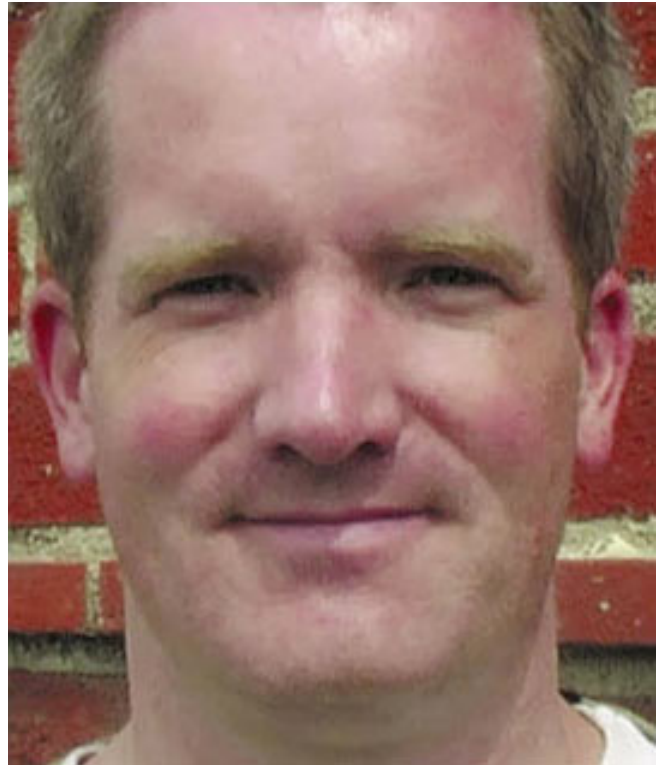
Started as computer animator for television and commercials. Provided digital and visual effects supervision at Boss Film Studios, Digital Domain and Sony Imageworks. Author of Visual Effects in a Digital World. Credits: Apollo 13, The Fifth Element, Godzilla, Spider-Man, Eight Legged Freaks, The Day After Tomorrow.



Matthew Gratzner

MINIATURE EFFECTS SUPERVISOR

Freelanced as prop and model builder until 1995 founding of Hunter/Gratzner Industries — with Shannon Blake Gans and Ian Hunter — which evolved into New Deal Studios. Credits: Alien Resurrection, Godzilla, The League of Extraordinary Gentlemen, The Forgotten, National Treasure, The Aviator.



Colin Green

PREVISUALIZATION SUPERVISOR

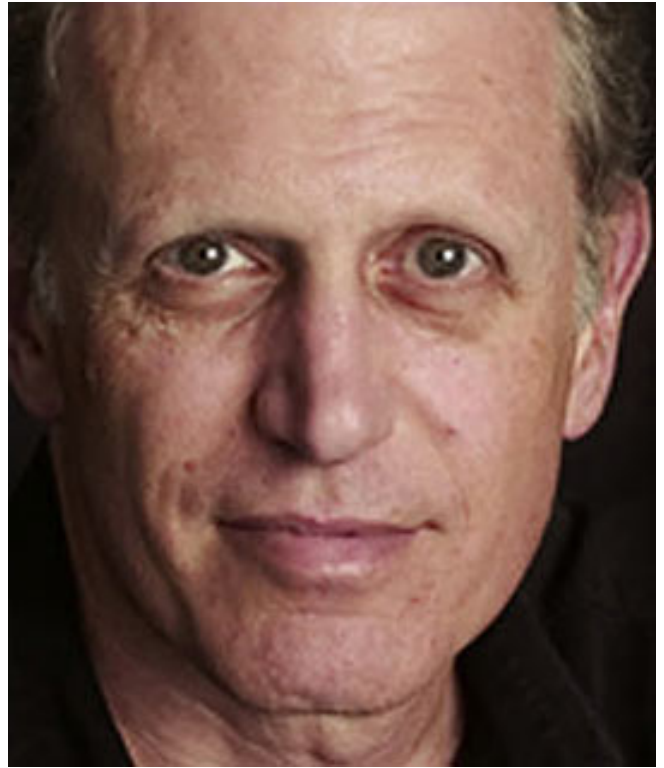
Started with Douglas Trumbull, 1992-1994. Got into previz at Cinergi Productions — later Mass Illusion. Formed Pixel Liberation Front in 1996. Credits: Judge Dredd, Starship Troopers, Fight Club, Minority Report, Panic Room, The Matrix 2/3, Pirates of the Caribbean, Van Helsing, I, Robot, The Brothers Grimm.



Kevin Tod Haug

VISUAL EFFECTS SUPERVISOR

Worked in motion control before shifting into digital production at The Post Group and Propaganda Films. Now independent, specializes in assembling teams of freelancers and small vendors for modest-size films with strong directorial vision. Credits: The Game, Fight Club, The Cell, Panic Room, Finding Neverland.



Richard Hollander

VISUAL EFFECTS SUPERVISOR

Designed motion control systems for Robert Abel & Assoc and Douglas Trumbull. In 1987, co-founded Video Image/VIFX, sold to Rhythm & Hues in 1999. Now president of the R&H film division. Credits: Face/Off, Titanic, Blade, Harry Potter 1, Daredevil, X2: X-Men United, The Cat in the Hat, Garfield, Scooby-Doo 2.



Ian Hunter

MINIATURE EFFECTS SUPERVISOR

After six years with Stetson Visual Services, joined Matthew Gratzner and Shannon Blake Gans to form Hunter/Gratzner Industries — now New Deal Studios. Credits: The Hudsucker Proxy, Waterworld, Batman & Robin, The X-Files, Pitch Black, End of Days, Terminator 3, The Chronicles of Riddick. Upcoming: Constantine.



Joel Hynek

VISUAL EFFECTS SUPERVISOR

Worked at R/Greenberg Associates, The Trumbull Company, Mass Illusion and Manex before joining Digital Domain in 2002. Academy Award: What Dreams May Come. Nomination: Predator. Credits: Zelig, Die Hard 3, Ladyhawke, Judge Dredd, Eraser, The Matrix, Frida, XXX, The Missing. Upcoming: Stealth.



Steve Johnson

SPECIAL EFFECTS DESIGNER

After four years with Rick Baker, headed creature shop at Boss Film Studios before forming XFX — now Edge FX — in 1986. Credits include: Ghostbusters, The Abyss, Species I/II, Men in Black, Sphere, Bicentennial Man, Blade II, The Cat in the Hat, Scooby-Doo 2, The League of Extraordinary Gentlemen, Spider-Man 2.



Andy Jones

ANIMATION DIRECTOR

Began career as character animator at Digital Domain in 1996. Left to serve as lead animator on Godzilla at Centropolis Effects, then joined Square USA as animation director on Final Fantasy. Directed "The Final Flight of the Osiris" segment of The Animatrix. Returned to Digital Domain in 2003. Credits: Titanic, I, Robot.



John Knoll

VISUAL EFFECTS SUPERVISOR

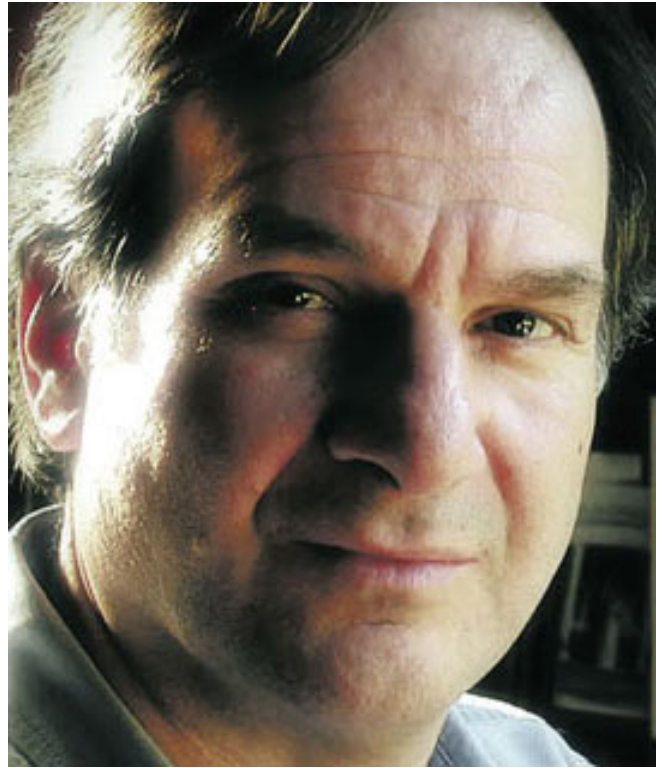
Joined Industrial Light & Magic in 1986. After three years as motion control camera operator, moved into digital effects. With brother Thomas, created Photoshop. Oscar nominations: Star Wars I/II, Pirates of the Caribbean. Credits: Mission: Impossible, Deep Blue Sea. Upcoming: Star Wars III: Revenge of the Sith.



Henry LaBounta

VISUAL EFFECTS SUPERVISOR

With digital animation background in broadcast industry, joined Industrial Light & Magic in 1993. Left in 1996 for DreamWorks Animation, then joined PDI/DreamWorks, 1998-2001. Currently with Electronic Arts Canada. Oscar nomination: Twister. Credits: Casper, Mission: Impossible 2, A.I., Minority Report.



Robert Legato

VISUAL EFFECTS SUPERVISOR

As visual effects supervisor on Star Trek: The Next Generation and Deep Space Nine, earned two Emmy Awards. Joined Digital Domain in 1994, then Sony Pictures Imageworks in 1999. Academy Award: Titanic. Nomination: Apollo 13. Credits: Interview With the Vampire, What Lies Beneath, Harry Potter 1, The Aviator.



Van Ling

VISUAL EFFECTS SUPERVISOR

Started career at Lightstorm Entertainment as technical liaison to James Cameron, later head of production. Formed Banned From the Ranch, with Casey Cannon, and served as creative director, 1994-1999. Credits: The Abyss, Terminator 2, Twister, Titanic, Paulie, Doctor Dolittle, Stir of Echoes, Not Another Teen Movie.



Kevin Mack

VISUAL EFFECTS SUPERVISOR

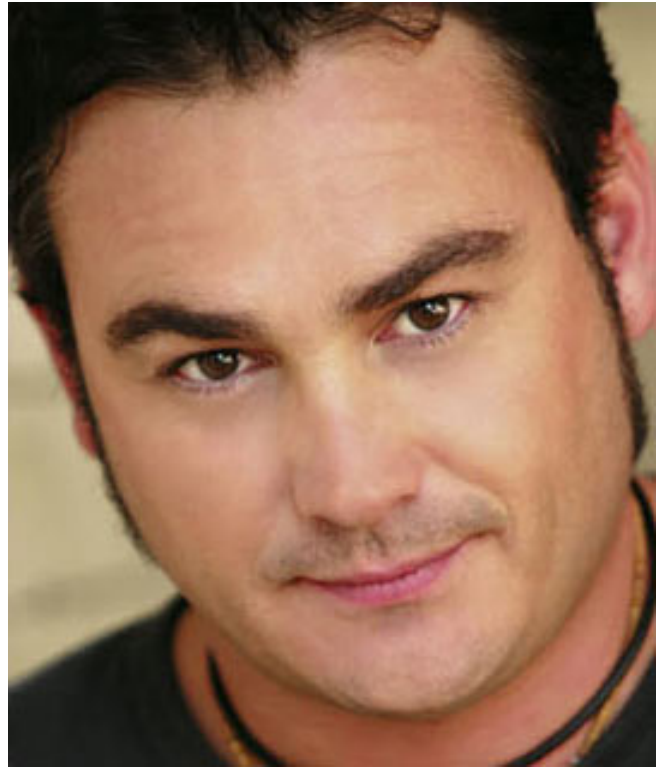
Began as a freelance artist creating matte paintings and miniatures. Advanced to visual effects supervisor at Digital Domain, 1994-2002, then moved to Sony Pictures Imageworks. Academy Award: What Dreams May Come. Credits: Fight Club, How the Grinch Stole Christmas, Vanilla Sky, A Beautiful Mind, Big Fish.



Gray Marshall

VISUAL EFFECTS SUPERVISOR

Started career in motion control, then transitioned into digital effects. Worked at Boss Film Studios, then joined Digital Domain, 1994-1997. In 1997, founded Gray Matter FX with Margaux Mackay. Credits: Being John Malkovich, Adaptation, Secret Window, The Life Aquatic With Steve Zissou. Upcoming: Lords of Dogtown.



Nathan McGuinness

VISUAL EFFECTS SUPERVISOR

Started career in native Australia. Moved to the United States and joined Planet Blue, 1996-1998. Founded Asylum Visual Effects in 1999. Oscar nomination: Master and Commander. Credits: Moulin Rouge, Behind Enemy Lines, Black Hawk Down, Minority Report, Down With Love, The Phantom of the Opera.



Tim McHugh

VISUAL EFFECTS SUPERVISOR

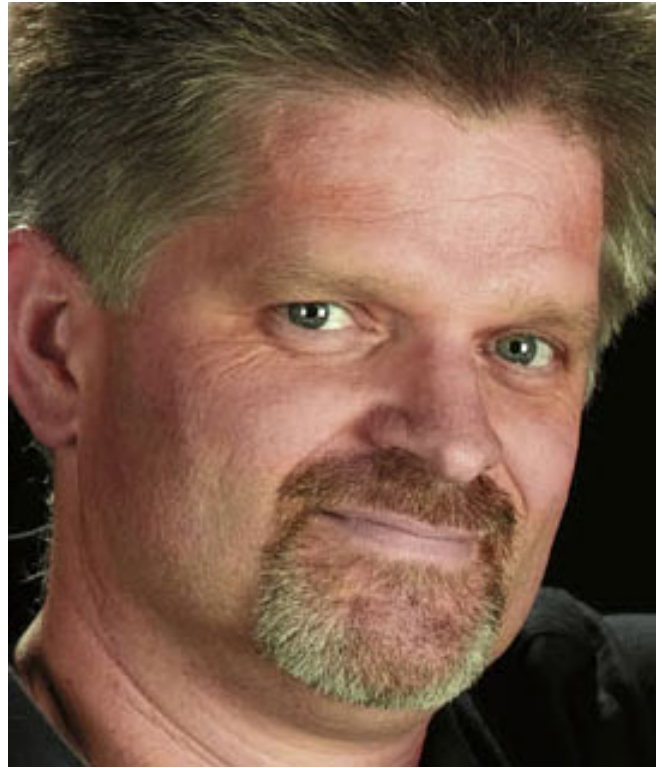
Began career in 1978. Worked at Entertainment Effects Group, Apogee and Buena Vista Visual Effects. In 1993, founded Area 51, specializing in visual effects for television. Emmy Awards: Dune, Children of Dune. Credits: The X-Files, Space: Above and Beyond, From the Earth to the Moon, Threat Matrix,.



Dennis Muren

VISUAL EFFECTS SUPERVISOR

Joined Industrial Light & Magic as part of the original Star Wars team. Academy Awards: The Empire Strikes Back, E.T., Return of the Jedi, Indiana Jones 2, Innerspace, The Abyss, Terminator 2, Jurassic Park. First effects artist to be honored with a star on Hollywood Walk of Fame. Upcoming: The War of the Worlds.



Erik Nash

VISUAL EFFECTS SUPERVISOR

Started in visual effects cinematography with Star Trek: The Motion Picture, then spent eight seasons on Star Trek: The Next Generation and Deep Space Nine, earning two Emmy Awards. Joined Digital Domain in 1994. Credits: Apollo 13, Titanic, Armageddon, O Brother, Where Art Thou?, The Time Machine. I, Robot.



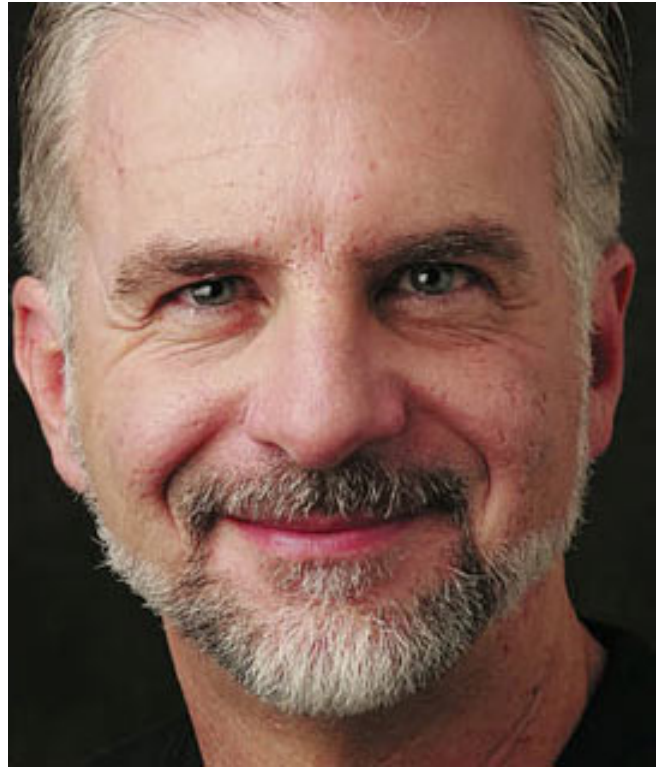
Jeffrey A. Okun

VISUAL EFFECTS SUPERVISOR

Gained entry into visual effects in the employ of Saul Bass, acting as liaison with numerous optical houses. Began consulting with film studios, then became independent visual effects supervisor.

Credits: Stargate, Cutthroat Island, Sphere, Deep Blue Sea, Red Planet, The Last Samurai.

Upcoming: Elizabethtown.



Ken Ralston

VISUAL EFFECTS SUPERVISOR

Started at Cascade Pictures in 1971. After 20 years at Industrial Light & Magic, joined Sony Pictures Imageworks as president in 1995.

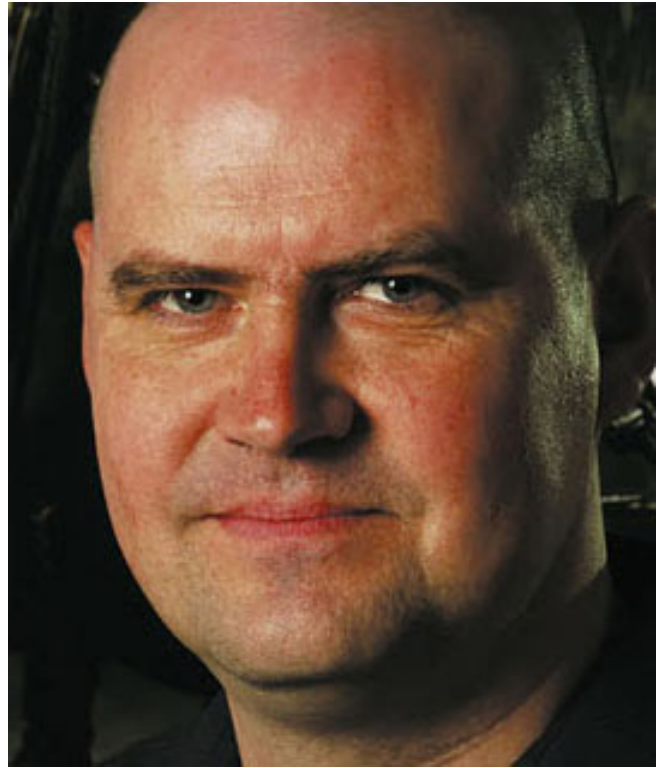
Academy Awards: The Return of the Jedi, Cocoon, Who Framed Roger Rabbit, Forrest Gump. Credits: Back to the Future I/II/III, Contact, Cast Away, Men in Black II, The Polar Express.



Robert Skotak

VISUAL EFFECTS SUPERVISOR

Began career at Roger Corman's New World Special Effects. Formed 4-Ward Productions — with brother Dennis and Elaine Edford — in 1989. Academy Awards: Aliens, Terminator 2. Credits: The Abyss, Tremors, Batman Returns, Heart and Souls, Mars Attacks!, Titanic, House on Haunted Hill, X2: X-Men United, The Stepford Wives.



Ben Snow

VISUAL EFFECTS SUPERVISOR

Worked in computer animation in England and native Australia. Joined Industrial Light & Magic in 1994 as technical director, advanced to visual effects supervisor. Oscar nominations: Pearl Harbor, Star Wars II. Credits: Casper, Mars Attacks!, Twister, The Lost World, Deep Impact, The Mummy, Galaxy Quest, Van Helsing.



Mark Stetson

VISUAL EFFECTS SUPERVISOR

Began as modelmaker. Partnered in Stetson Visual Services — with Robert Spurlock — 1989-1995. Supervised at Digital Domain, 1996-1999. Joined Sony Pictures Imageworks in 2002. Academy Award: The Fellowship of the Ring. Credits: True Lies, The Fifth Element, Charlie's Angels 2, Peter Pan. Upcoming: Superman Returns.



Patrick Tatopoulos

CREATURE & PRODUCTION DESIGNER

Spent several years in Italy and Greece doing fine art and illustration before relocating to the United States to pursue career in film. Formed Patrick Tatopoulos Design in 1993. Credits: Stargate, Independence Day, Godzilla, Dark City, Pitch Black, Underworld, Van Helsing, I, Robot. Upcoming: Underworld 2, Rahan.



Bill Taylor

VISUAL EFFECTS SUPERVISOR

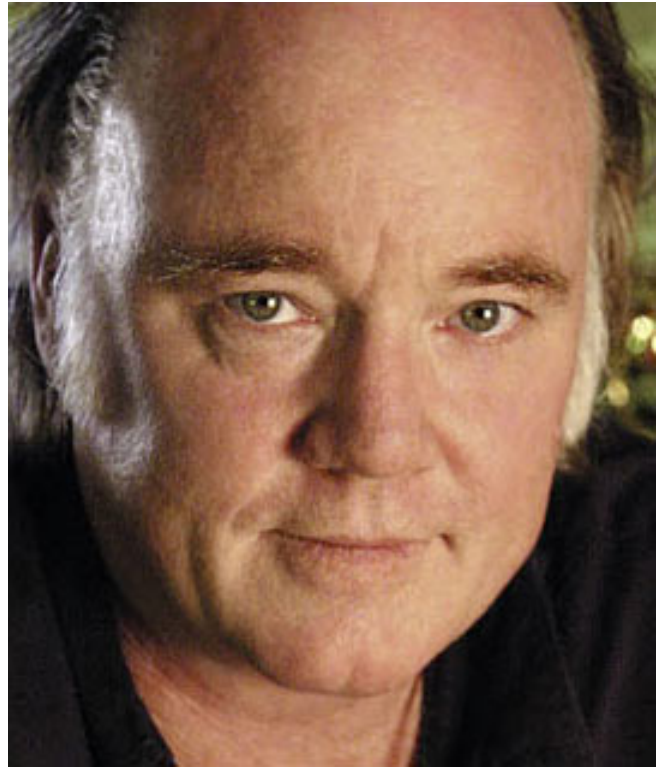
Spent ten years as an optical cameraman, mastering bluescreen photography and compositing under Petro Vlahos. Worked with Linwood Dunn, then Albert Whitlock, 1975-1984. In 1985, formed Illusion Arts with Syd Dutton. Credits: The Fast and the Furious, XXX, Star Trek Nemesis, Bruce Almighty, Ladder 49.



Richard Taylor

MAKEUP & CREATURE CREATOR

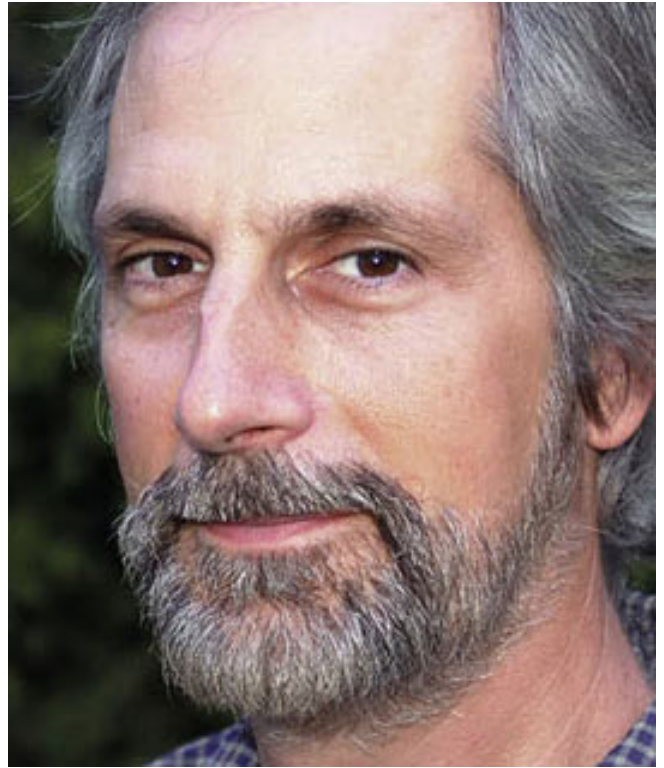
With Tania Rodger, formed New Zealand special effects company in 1987, which, in partnership with Peter Jackson and Jamie Selkirk, became Weta Workshop. Academy Awards: The Fellowship of the Ring, The Return of the King. Credits: Heavenly Creatures, The Frighteners, The Two Towers. Upcoming: King Kong.



Phil Tippett

VISUAL EFFECTS SUPERVISOR

Began as stop-motion animator. Joined Industrial Light & Magic, 1975-1984. Formed Tippett Studio, with Jules Roman and Craig Hayes, in 1985. Director: Starship Troopers 2. Academy Awards: Return of the Jedi, Jurassic Park. Nominations: Dragonslayer, Willow, Dragonheart, Starship Troopers. Credits: RoboCop 1/2/3.



John Van Vliet

VISUAL EFFECTS SUPERVISOR

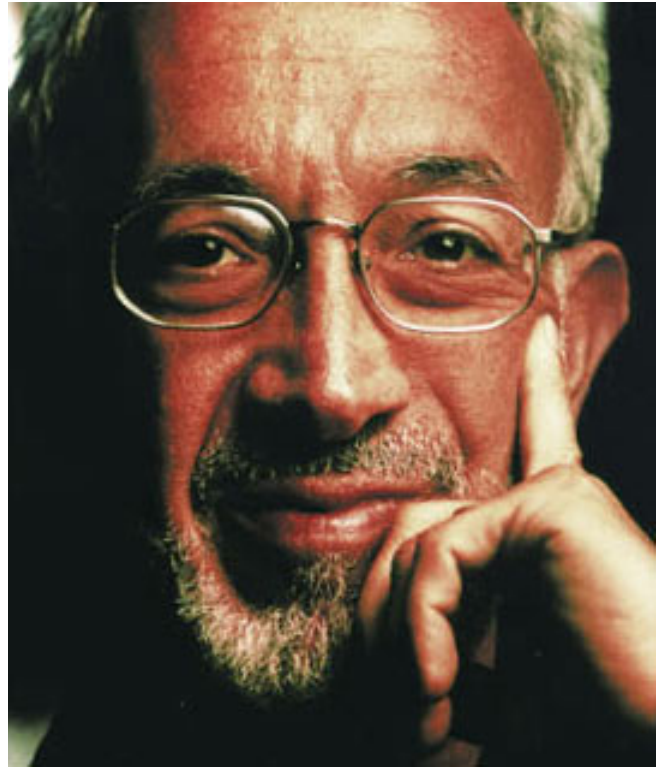
Started as an animator at Industrial Light & Magic, 1979-1981, then joined Disney to work on Tron. Owned and operated Available Light, with partner Katherine Kean, 1983-2000. Now independent. Credits: The Empire Strikes Back, Ghost, Stargate, My Favorite Martian, X-Men, Hart's War. Upcoming: Herbie: Fully Loaded.



Brian Van't Hul

VISUAL EFFECTS SUPERVISOR

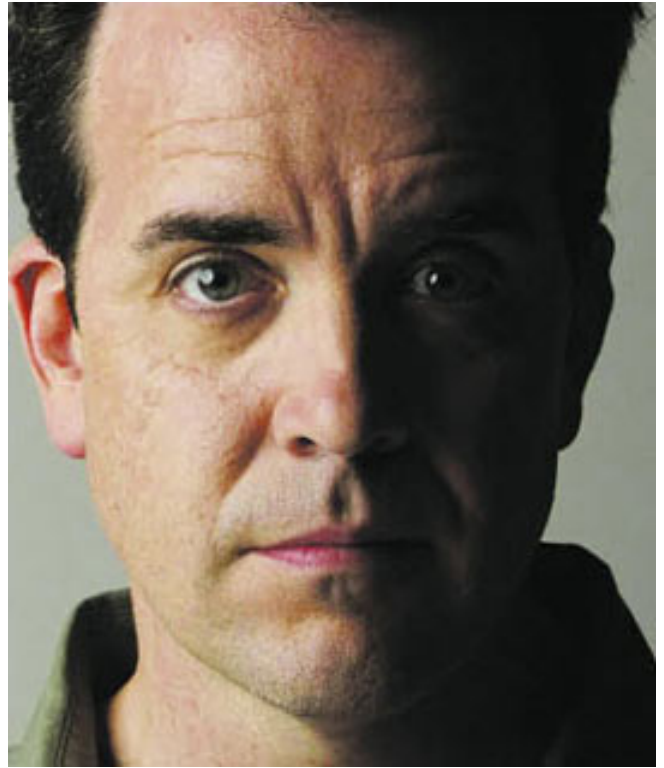
Worked in motion control at Van Der Veer, Industrial Light & Magic, Image G and Skellington Productions, then as technical director at ILM and Sony Imageworks. Joined Weta in 1998. Credits: The Fellowship of the Ring, The Two Towers, Master and Commander, The Return of the King, I, Robot. Upcoming: King Kong.



Stan Winston

CHARACTER CREATOR

Acting aspirations gave way to makeup and animatronics. Formed Stan Winston Studio in 1981. Director: Pumpkinhead, A Gnome Named Gnorm. Academy Awards: Aliens, Terminator 2, Jurassic Park. Nominations: Heartbeeps, Predator, Edward Scissorhands, Batman Returns, The Lost World, A.I. Upcoming: Zathura.



Tom Woodruff, Jr.

CREATURE EFFECTS CREATOR

Spent six years at Stan Winston Studio, then founded Amalgamated Dynamics Incorporated, with Alec Gillis, in 1990. Veteran creature-suit performer. Credits: Alien3, The Santa Clause 1/2, Jumanji, My Favorite Martian, Hollow Man, The Sixth Day, Evolution, Alien Vs. Predator. Upcoming: Superman Returns.

CINEFEX: Given the origins of digital imagery in movies — the fact that it was created using massive Cray supercomputers at the start, and then later on expensive, non-intuitive Silicon Graphics machines — did anyone expect that, ten or fifteen years later, people would be doing visual effects on what amount to personal computers?

DENNIS MUREN: That surprised me. I didn't know it was going to turn out to be something that you could basically do in your home. It isn't like the old days, when you had to get a camera, learn how to thread the camera, learn how to build a model, find the glues at the hobby shop, learn how to make a pyro thing — all yourself. In the CG world, there is all this great software easily available, not to mention hundreds of books on Maya and Photoshop and StudioMax to educate people on how to use it.

CINEFEX: What have been digital technology's most significant contributions to visual effects?

MARK STETSON: The integration of visual effects shots is much easier now. You don't have the limitations that you had 20 years ago of trying to make shots fit within the style of a film. We've passed the place where the film stops, the visual effects come up, then they go down, and the film continues. That interruptive feeling of the work isn't even an issue anymore.

ERIC BREVIG: I look at it as a much better tool with which to do the same things we've always done. Almost every digital tool we have has a counterpart in the analog world. Motion capture was rotoscoping, for example. Ray Harryhausen would shoot guys as skeletons fighting, and then he'd match it frame by frame — it was motion capture, without digital tools. Digital just allows us to do all of those old things at a much higher level. We can refine the craft because we can build upon our successes until the shot is done, instead of starting a whole new try at it every time.

RICHARD EDLUND: And that means we can be much bolder. That's another one of the beauties of digital visual effects compared to photochemical. I've always said that *Multiplicity* would never have been made if we hadn't been in a digital world. No way would anybody have tried that.

JOHN KNOLL: Digital compositing, especially, has been a godsend. Once you fix something, you can be sure it will stay fixed — and then you can go on to the next problem. Optical compositing was always a performance. Load this element and this projector head on the



Hoyt Yeatman

VISUAL EFFECTS SUPERVISOR

Co-founded Dream Quest Images in 1980. Company acquired by Disney in 1996, renamed The Secret Lab, and shut down in 2001. Launched Whamaphram Productions, with David James, in 2004. Academy Award: *The Abyss*. Nomination: *Mighty Joe Young*. Credits: *The Fly*, *Short Circuit*, *Crimson Tide*, *Mission to Mars*.

printer, wind to this frame, set your position to 15,000 north and 12,000 south, set the focus ever so slightly out to soften that, put this color filtration on here, shoot with this exposure, then wind back — and you'd do all of that for dozens of passes! And invariably there would be some mistake; so you'd fix that, and then something else would go wrong. I don't miss the not-so-good-old-days of optical compositing.

BILL TAYLOR: The promise of the digital era — and I think Dennis Muren was the first person to say this — is that if you do it right, every step is a step forward. You have the power to edit and refine, edit and refine...

ROB LEGATO: And because digital allows you to do things over and over again — an opportunity you would never get on film — you get better at it. It's like editing on the Avid. I can make ten mistakes and finally get it on the eleventh try. If I did that on film, I'd be fired before I ever got to the eleventh try! On the Avid, no one has to see my ten mistakes — and so, all of a sudden, I'm a pretty decent editor. That's what digital has given us.

TIM McHUGH: The speed at which we can work is truly staggering, as well. When we did *Blade Runner*, we'd shoot the spinner flying, shoot the background on another stage, take those elements to the optical department for hand-roto, get the mattes pulled, get the compositing done. It would be at least two weeks before you saw that shot as Take 1. Now, you can do all of that in hours. Another thing — back when we did *Battlestar Galactica*, there was one *Galactica* spaceship, sitting on one bluescreen stage, with one crew. So there was a finite number of shots you could get. Today, if you built the *Galactica* as a digital model, that ship could show up on an infinite number of workstations, simultaneously. How much work we can get done in a given length of time represents a huge revolution.

VAN LING: I would say that the pedestrian, unheralded things — like wire removal — have really been the most beneficial. Those kinds of utility shots, as opposed to the hero stuff, are probably a good 80 to 90 percent of the business.

CINEFEX: We have all of this amazing technology now, and it's available to virtually everyone doing this work; and yet, there's still a significant disparity in the quality of digital effects. How do you account for that?

KEVIN MACK: Like any other field, there's a population of people who do this work. And within that population there are people who do it extremely well, people who do it adequately, and people who aren't very good at it at all. So there is an inconsistency to the work, depending on who does it. It is still the rare, freakish talent who can really do it well. You cannot just hire anybody and train them to do this. You're looking for rock stars.

RANDY COOK: The technology actually allows mediocre artists to produce passable work. It's just like an only competent musician having the ability to orchestrate without having to study orchestration, due to the instruments that are sampled for use in the computer now.

KEVIN HAUG: It's all about the person who's pushing the pen — it's not about the pen itself. There was a period of time when the tool was more important than the artist — which was a sad state of affairs. I can remember when I worked at The Post Group, they sold Harry time. They didn't even tell the client who was on box. The client just bought X amount of Harry time, and

they assumed that whoever was running it was as good as anybody else. That thinking still hangs on a bit; but, for the most part, the technology is not what is driving things anymore.

DENNIS MUREN: I don't know... I've always thought that one of the reasons people came to ILM was because we were seen as leading technical innovation — which we were, but only by default. We weren't innovating just to be innovating. Back in the Star Wars days, it was the quest for imagery that drove the innovation, not the other way around. When John Dykstra looked at the animatics George had done using World War II dogfight footage, he innovated motion control programming because he saw that it was needed to get those kinds of images on the screen. Now there seems to be a push for innovation that isn't at all connected to a particular project.

CINEFEX: An example — ?

DENNIS MUREN: Hair and fur. This industry is totally hung up on hair and fur, totally hung up on fire. The audience doesn't give a hoot, but that's what is going on all over the industry. People are thinking that the innovation comes first; but I think that if you want to do that, you should be at a university, doing research. If you're going to work in visual effects, you have to assemble the tools that are needed for the project, and only write new ones when you need to — as opposed to trying to fit a really cool toolset into a project. Star Wars wasn't done that way; neither were T2 or Jurassic Park. A lot of people don't know that.

They think we were innovating, and that those projects grew out of that innovation. We were innovating, but it was all directed toward a specific application.

CINEFEX: Digital technology has been a liberating force, in that it allows you to do just about anything. But, creatively, is there a downside to the limitless possibilities it affords?

JOHN VAN VLIET: Sometimes we're asked to do some really stupid things, just because we can. It's like watching a monkey with a machine gun. A lot of the forces that use it just have no idea when and where to use it. So it's a rather undisciplined application at this point.

KEN RALSTON: The lack of limitations is the worst enemy of an artist. Because when you get to the point where anything can be done, it also means any kind of crap can be done. Any filmmaker with no talent can put all kinds of shit in a movie that you wouldn't watch with a gun



to your head. On the other hand, in the right hands, that technology can be used for all the right reasons, to make films you can be excited about.

ROB LEGATO: Any creative endeavor needs limitation as a point of departure. The limitation of a budget or something else. *Jaws* is the best example. If they could have done a CG shark, *Jaws* would not have been a classic — because they would have relied on the visual of the shark, and not on the very terrifying thing of what you imagined the shark looked like lurking under that water. Those yellow barrels went plop, plop, plop on the water, and you were scared shitless. But if there'd been a CG shark, that shot wouldn't have been necessary. You'd show the shark — 'Wow, isn't that scary?' And you know, it's not. Seeing the monster true-to-life is not scary. When you see monsters too much, they don't work. Limitations forced Steven Spielberg to create something that was truly terrifying.

PHIL TIPPETT: It's a matter of restraint. How many shots of that shark did he really need to tell that story? And how much more satisfying is it, really, when you're left wanting to see more, rather than dotting all the i's and crossing all the t's?

NED GORMAN: When we were prepping *The Lost World*, Steven said, 'Okay, I had 60 3D shots of dinosaurs in *Jurassic Park*; I'm giving myself 75 this time.' We wound up with 78, because we decided to go crazy and add three shots. But that is the kind of artful restraint shown by Steven Spielberg. He can look at a movie and know — it's one of his brilliances — 'I can tell my story and get a greater impact with less.' It's not even about the budget. He knows that visually, story-wise, it's better if he holds himself to fewer shots. That results in great stuff.

CINEFEX: The contrast is startling. A big-budget dinosaur movie made not that many years ago, and it had 78 digital effects. Now, it's not uncommon for a visual effects movie to have in excess of 1,000 shots.

NED GORMAN: And if you're going to do a movie with 1,000 visual effects shots, there'd better be a really good reason for all of them...

PATRICK TATOPOULOS: The limitation of smaller budgets, too — maybe they make us more clever? Think about it. You have a great young director who does a fabulous low-budget movie. Then they give him three times that amount of money, and somehow he gets lost, he loses the heart of things. Sometimes I think we are going down that same path in special effects. When we have to work with little money, we really have to brainstorm and be creative. It can be frustrating, because you want to take things to the next level — but it makes you fresh again.

BRIAN VAN'T HUL: A lack of money does lead to ingenuity. The older small effects shops, just to survive, couldn't always throw money at something to solve a problem. Now, it seems people will spend money to find a quick solution, rather than try to think of a new, innovative way to get around the problem. They just say, 'Let's buy that thing off the shelf; let's hire that person.' Rather than, 'Okay, with the people and the tools we have, how do we get this done?'

MATTHEW BUTLER: Look at the phenomenal effects in Blade Runner — none of them CG, all of them very clever. I look at that scene in Brazil where Robert De Niro is literally swallowed up in paperwork, and my jaw drops. What do we think we're doing? Who do we think we are? It was all done before — and done brilliantly. Let's just try to do it as good as that, and concentrate on making a good movie!

VAN LING: Before the computer handed them a solution to everything, visual effects artists really had to use their imaginations. They were always having to find new techniques to meet the director's vision. It wasn't — 'Well, we have this technique that allows us to do anything, so let's just come up with whatever we want.' In the old days, they had to figure out very specific ways of delivering shots. It was customized, hand-crafted effects. It was inherently creative. And that's very different from the assembly-line effects that you get with the computer.

JOHN VAN VLIET: It's basically a digital factory. Everything is menu-driven, a multiple-choice thing. I'm not discounting the talent of the people doing it; but it's not like the giants we had before. Before digital took over, we had some incredibly talented people who could basically carve out a movie by hand. Some of it was crude; but it was remarkable what they could do. People would draw and animate smoke, electricity, fire — and you could count on two hands the people who could do it well. And not a single one of us is doing it today, because now it is all plugins on software programs, or digitally capturing something and manipulating it. It's a lost art — the end of the age of wizards. What was the effort of a few people is now done by an army of thousands.

CINEFEX: You're saying that, due to digital technology, visual effects practitioners don't have to be as ingenious as they once were?



VAN LING: And not just the visual effects practitioners — the filmmakers, as well. On the one hand, filmmakers are now free to do anything, because there are no limits within the digital realm. But what I've found is that this completely open capability has left some filmmakers — the ones who aren't visionaries — rudderless to some degree. You go to them as an effects person, and say, 'What do you want?' And they'll say: 'Well...what have you got? You show me your cool techniques, and I'll come up with something.' Many directors, without this technology, were forced to be creative. They had to start with the story first, and then figure out the specific way they were going to get those shots into that story.

RICHARD EDLUND: You had to be inventive before the fact, in the old days. You'd get all your material ready, go on the stage, set up your machine gun nest because you knew the enemy was coming. It was like fighting a battle. I'm not one of those who's singing the blues for the passing of that. I spent many sleepless nights in a wrestling match with the photochemical process. I developed a lot of ways to master it, and I was pretty successful; but it was always a real tough grind. The digital world is a lot more fun. In the digital world, you can show up on the stage like a gunslinger. You're more free to kick ideas around with the director, and just figure out on the spot how you're going to shoot what you need to make it work. It is much freer.

DENNIS MUREN: It still requires ingenuity. Ingenuity is going on all the time. You think about the ingenuity of the old days, and it's Richard Edlund blowing apart the house in *Poltergeist* with a shotgun. But we didn't invent that shotgun to do that — we had it. It was just putting pieces together in an interesting way to do something new; and that still goes on.

CINEFEX: Not that long ago, most filmmakers were relatively ignorant about digital technology. Has that changed? Do directors now have a pretty good grasp of the capabilities of CG?

NED GORMAN: Oh, yeah. When I came to ILM in 1982 for *Return of the Jedi*, we were still sort of the 'mysterious wizards to the north.' There was very little coverage of visual effects at the time, and so studio people, directors and producers were still in the dark. But the directors coming up now, most of whom came of age in that period, are very savvy.

ERIC BREVIG: I think directors are definitely more effects aware, but that doesn't mean that they really understand what's involved. As an industry, we may have hurt ourselves by making things look too easy — bragging about how nowadays you don't have to shoot or light things properly because we can fix it with our digital tools. But, that is never really true. It's only true if mediocre work is okay. If you want it to be great, you still have to work really hard to shoot and light things right.

KEN RALSTON: Some directors, if they're not intimately involved with how the work is being produced, think that anything they ask for can be done, just like that. In their minds, the world of digital is easy. You just press a button, and there's your ten shots. They don't realize the difficulty involved. And, to some extent, that has changed the attitude of directors toward visual effects. In the photochemical days, effects work held a kind of mystery to it; and so, the directors were a lot more embracing of your ideas.

TIM McHUGH: It's true. When I was 20 years old and really didn't know what I was doing, I'd walk out on a bluescreen stage and the crew was always very deferential to me. The DP would ask, 'Is this the way you want it?' The director would walk me through the staging. There was a sacredness to effects, because it was only understood by a few people. Now that I'm older and actually know what I'm doing, I feel as if we get almost no respect. People couldn't care less about what we do. We're just sort of in the way. And they all know it can be fixed in post anyway, with a button push. There's the 'dinosaur' button and the 'tornado' button, and the 'army' button...

JEFF OKUN: I'm a huge fan of George Lucas; but in a sense, his publicizing of the magic in the first Star Wars movie started a mis-education project — and now, everybody knows how to do effects! The mis-educated think that there's a button on the computer that says 'fix it,' and you just hit it, and we all go out for drinks.

CINEFEX: You'd think effects people would have more clout than ever. Movies are marketed as effects extravaganzas, and most of the 20 or 30 highest-grossing films of all time are effects films. It seems visual effects would get more consideration now.

JEFF OKUN: Not at all. My experience is that we're considered a tremendous nuisance all the way through. You can be the second or third person hired on a film, and involved in an inordinate amount of preproduction time, but nobody listens to what you have to say. It's like they're doing 'due diligence' by having you there — but, really, they just wish you'd go away.

CINEFEX: Visual effects — the Ugly Stepchild of production. Are there any signs of that situation improving?

KEVIN MACK: I think so. I think visual effects are finally being recognized by the studios and by producers as being a significant creative aspect of the production. I've been fortunate in that



most of the productions I've been involved with, I've been embraced as a key creative collaborator.

MATTHEW BUTLER: My experience with Rob Cohen on XXX was great. It was the first time I saw visual effects working with production at that level. So, yes, it is better — but it needs to get better still. CG is still somewhat new in the filmmaking industry, and visual effects are still not fully recognized as part of the team. When it happens, like on XXX, it's a dream. But it's more often like pulling teeth.

CINEFEX: This greater awareness of digital technology, this 'mis-educated' perception that it affords a quick and easy solution — does that encourage a more lackadaisical attitude on set? Is the 'fix it in post' mentality increasing?

Steve Begg: The tendency to ignore problems on the set and worry about them later — in other words, to make them someone else's problem — is increasing. The post crews are having to fix more stuff than they had to in the past, because the ability to manipulate every pixel in a film is promoting sloppy filmmaking up front. Bad cinematography has to be resurrected, a bad stunt has to be retimed, bad takes have to be rescued by split-screening two characters into a single take. That's just cheating it too far, for my liking.

ROB LEGATO: By relying on the computer, you shortcut what you would have shot on the set, and you eliminate the discipline it takes to decide if this angle is better than this angle. 'I'll just grab a plate anywhere and fill it in later' is a pretty cavalier, generic attitude — and it's a recipe for a generic shot. When I shoot something, I am very rigid about it being just so. I don't trust in my ability to manipulate it later. I act as if I've got one crack at it. When I do that, the shot turns out well. When I don't do that, when I become lazy, and say, 'It's going to take another hour to set this up right — I'll play with it later,' it always looks processed. It's like I've lost the soul of the shot.

TIM McHUGH: There is this reliance on digital as a safety net. 'Whatever it takes to get it off the stage, we don't care. We're not shooting a second pass. We're not going to measure anything. You go figure it out later.' It's frustrating.

MATTHEW BUTLER: I've been on shows where the special effects people told me, 'Normally, we would have painted those wires black to make them disappear in the shot; but we didn't, because you guys are going to fix it anyway.' That drives me nuts, because it's so wasteful. No! Put your energy into making that special effects shot as good as it can be, and spend the CG money when you really need to.

ALEX FUNKE: Here's the problem with fixing it in post — if you spend all your time fixing a shot, you don't have time to make it look cool!

JOHN VAN VLIET: Right — the best it's ever going to look is 'okay.' But it's very seductive to avoid problems on the set. Everyone's tired, and they just want to make their pages for the day. So they ask, 'Can you fix that?' You say, 'Sure' — and what would have taken three minutes to fix on set winds up costing \$10,000 and God knows how much effort in post. It's used badly to cover poor planning and mistakes. They'll squander all of their resources fixing stupid things that they could have taken care of while they were there.

JEFF OKUN: I got to a point with one director where, every time he said, 'Fix this in post,' I'd say, 'Okay, but you'll have to sign this piece of paper — it's an estimate of what it's going to cost to do that.' On one show, I ran up a tally of \$8 million to do all these fixes! And the director said, 'Where are we getting that \$8 million?' I said: 'I don't know. You're the one who said 'you fix it' on all these shots — you figure out where the \$8 million is coming from!'

CINEFEX: With the availability of previz, the ability to plan everything out before the shoot, you'd think that there would be less need to fix stuff in post.

BROOKE BRETON: The more you go in prepared, the more work you do up front, the better. But studios try to save time and money in preproduction, and then everything starts to skyrocket at the end — and often, the visual effects team becomes the fall guy. When, really, it was just that they needed that additional four weeks or so of getting their act together in the beginning.

JOHN VAN VLIET: The joke is, 'Prep was on a Tuesday — after lunch.' We often jump into shows with no clear idea of what's going on. A show that will remain nameless asked if I was interested in supervising, just as they were starting to film — and they had over 1,000 shots! It was like, 'What, are you crazy?'

PADDY EASON: I've always thought it would be fun to get some T-shirts made up for the visual effects team that said 'Fix it in Pre' — because, really, the way to do it right is to figure it all out in preproduction.



VOLKER ENGEL: If you don't want to fix it in post, you have to get with people as early as possible and plan everything out. On Coronado, we went to Hunter-Gratzner four months before they even had to start building anything; and they said to us: 'This never happened to us before in our entire career. Usually, we're brought in two weeks before it has to be done!' I had the feeling that everybody there was so much happier building that stuff, because they had time to deliver quality work.

IAN HUNTER: What usually happens is, preproduction times are cut, and so the director, producer and cinematographer don't have time to adequately plan what they are going to do. So, during production, they'll go out there in desperation, throw up a greenscreen, and say, 'Oh, in post we'll add something there.' Sometimes they don't even have time to throw up the greenscreen! They just have to go with what they've got, knowing that some poor Cal Arts grad is going to have to sit there and rotoscope someone's head to pull them out of the shot.

JEFF OKUN: It's not money, it's not time, and it's not people. It is planning and setting it up properly. It means, 'Let's talk about it, agree on what we're going to do, and then do it.' It doesn't mean, 'Let's talk about it, agree on what we're going to do, and then revise everything because when I said I wanted a boat I really wanted an airplane.' It goes back to my point about mis-education. A lot of the behind-the-scenes documentaries and publications don't go into what really happens — rightfully so, I guess. They don't say: 'We designed the sequence, we argued and fought about it; but then we finally agreed on it. Then we shot it and put it all together, and it was a huge disappointment. So we panicked and had to figure out how to do something else. We shot new stuff, and put that together, and he still didn't like it, so he threatened to fire me' — nobody ever talks about all of that.

CINEFEX: The 'party line' is always, 'There was planning, there was execution, and it worked — The End.'

JEFF OKUN: That's right. And that's a problem, especially when you're working with a first-time director who has read this stuff and believes it! I had a first-time director on a high-budget movie, and we'd already missed the turnover day when he came to me, and said: 'I don't like the suits, I don't like the sets, I don't like the creatures — and I know you can fix all of that in the next three days.' 'Uh, no, we can't, man — that's crazy talk.' And he's looking at me like I'm lying to him, like I'm just not cooperating.

SYD DUTTON: A last sunrise shot in Van Helsing was shot only a month before the movie was released. So good old Bill Taylor went out at four o'clock in the morning and shot sunrise after sunrise. But the DP said, 'No, let's do this' — and it was already 10 o'clock by then. So we had to make that into a sunrise shot. By the time we got done with it, it looked pretty good. But afterwards, I went to the filmmakers, and said, 'Please don't do that again.' And they said: 'Why? You just proved you could do it!'

RICHARD HOLLANDER: Unfortunately, or fortunately, we have been very successful at ‘fixing it in post.’ People in the industry will tell me: ‘They shot it wrong; then they handed it to us all wrong; and then they asked us to repair it — and we did, and we did a good job. And the bad news is that now they’re going to think that’s the norm.’ Well, you know what? That is the norm!

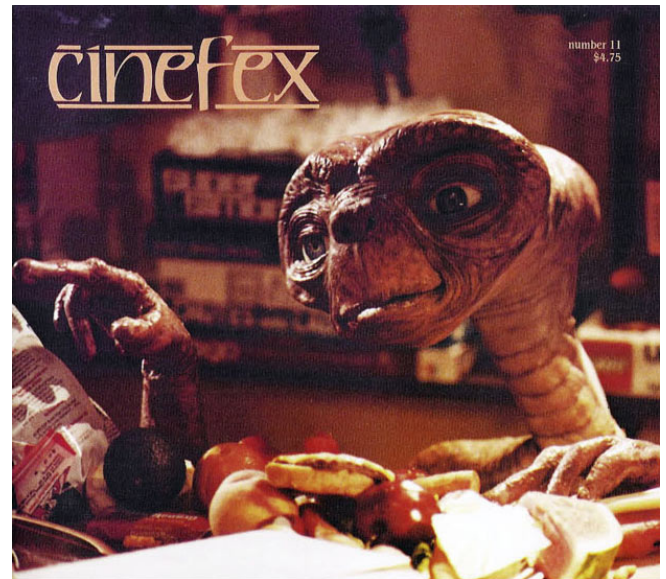
CINEFEX: In past interviews, many of you have mentioned ever-decreasing preproduction and postproduction periods. Why is that happening?

RICHARD EDLUND: Because in development land, you have four or five writers who contribute to the script; and, meanwhile, the movie’s been greenlit — but the script still isn’t ready. So this incredibly lugubrious machine lumbers to the production starting gate, and you have a script that nobody feels is ready to shoot, but the studio has bought off on it. So the movie takes on a life of its own — and sometimes, it doesn’t have a very high IQ!

IAN HUNTER: Here’s the problem. The studios used to be run by people who knew how to make movies. But when movies took off in the 1970s and became these amazing profit centers, big corporations decided to get into the movie business. So now we have middle managers reporting to bigger bosses, and they are under pressure to make the product for less. They cut preproduction and postproduction, because in the corporate world, they don’t understand what preproduction and postproduction mean to a movie. They just want production, because production equals product. So they go right to shooting, without a finished script. They get something shot, then they go to post — which has also been cut short — and try to assemble it. Of course, the corporations still want all the bells and whistles in the effects — but they don’t give you enough time to do it.

MATTHEW GRATZNER: We look at how many weeks we’ve been given, historically, and every year it’s less and less — to the point where we’re turning stuff around in three months, when it should have been a six-month schedule. It’s crazy.

RICK BAKER: When I did American Werewolf, people said: ‘Wow, we haven’t seen stuff like this before! What’s the new material that made this stuff look so amazing?’ But it wasn’t the material; it was that we had some money, and we had some time. By the time I did Planet of the Apes, I had four months for preproduction, when I should have had a year. The unfortunate



thing is, we did it in that four months! And the next time, they think, 'Well, they did that in four months — couldn't they do it in two?' And it keeps going like that; and it will continue to go like that, until somebody fails.

JEFF OKUN: I visited a movie recently that's in grave trouble. The effects people are working around the clock, with emergency stuff farmed out all over the place. And they were all saying, 'If we just fail, maybe they'll learn that you can't make a movie this way.' But nobody wants to fail.

KEVIN MACK: It's an escalation thing. The technology gets faster and better, we get more experienced and have better tools; and because of the pressure to get the work, companies bite off more than they can chew. And they wind up getting it done, one way or the other. But, unfortunately, it comes out of the hides of the people doing the work. As soon as you heroically do the impossible, then that becomes what's expected.

MARK STETSON: We deliver miracles on a shoestring again and again — and then everyone just assumes we'll continue to deliver miracles.

KEVIN MACK: And there's a backlash. You burn out a bunch of people, and they go work somewhere else. Sony has learned that if they don't keep an eye on that, they lose their best people.

MARK STETSON: I think the next step in the maturing of the industry will be further integrating ourselves into the production process, to the point that we can defend ourselves against that kind of thing, just as any other department might.

CINEFEX: Increasingly, it seems that effects are being integrated into the production process. Do you find there is now a blurring of the boundaries between production design, cinematography and visual effects?

BROOKE BRETON: I'm seeing that. It used to be, 'Here comes the visual effects team, and they're going to shoot their plates, and then they're going to go away and work on this for a period of time.' Now, there is the opportunity to work closely together, because all of these crafts are overlapping.

CINEFEX: The blurring of boundaries requires greater cooperation between departments that haven't always seen eye to eye. For example, how is it affecting the relationship between cinematographers and the visual effects team?

GRAY MARSHALL: We can be a real asset to the cinematographer; but we are more often seen as an impediment. I got a chance to work with Conrad Hall on a commercial once — he was, of course, one of the great cinematographers. We were doing a lot of greenscreen, and he wasn't having a good time. 'I could be back on my island in Tahiti,' is what I believe he said. And I was crushed. But it wasn't personal. What I realized is that cinematographers are constructionists — they work to bring everything together in front of the lens. And visual effects artists are deconstructionists — 'Give us the pieces, we'll build it for you.' And the two are often at odds. It takes time for them to realize you're on their side and trying to create a movie just as much as they are.



JEFF OKUN: Part of the problem is that a lot of directors of photography are very worried about what people are going to see in the dailies. Their careers rise and fall on that, because no matter how educated the studio executives or the producers are, if they see a shot in dailies that doesn't look good because it's a visual effects shot, that reflects on the DP — or the DP thinks it reflects on him. So you get a lot of resistance from the DPs if you want to shoot something that might make them look bad. You are asking them to put their careers in your hands, and I don't know many of them who willingly do that.

CINEFEX: Is there closer interaction between the effects people and production designers today?

GRAY MARSHALL: We try to involve the production designers as much as possible. Unfortunately, in many cases they are off the show after production wraps, so they aren't around during postproduction. It would be nice to see a shift in paradigm, where production design is more a part of post. We have a couple of upcoming projects where, in many ways, our duty is more to serve the production design than any other aspect of the story.

PATRICK TATOPOULOS: It's always in the best interests of the movie to keep the integrity of a design all the way — but, very often, you lose track of it. You design something, and then it goes into animation, for example, and it begins to take a different turn. More and more, as a production designer, I'm fighting to make sure that I'm involved all the way through, to maintain the integrity of the design.

KEVIN HAUG: The effects facilities try to hang on to that design integrity with digital art directors, effects DPs — all these people who are really good at matching someone else's work. But, still, they haven't been around to see why the original designers made certain choices, and they can't get a hold of those people because they've already moved on to other movies.

CINEFEX: The ability to change the intent of the production designer or even the DP after production has wrapped is greater than ever now, due to all the tweaking that can be done in post, in the digital intermediate suite. Is that being abused?

KEVIN HAUG: There's always been a kind of polite antagonism between the production designer and the DP on set — but the digital intermediate is where the rubber really meets the road. I've seen directors and DPs conspire to change the color of a set that was very carefully chosen by the production designer. They'll go, 'Hmmm, why don't we make it a little greener?' And all of a sudden, everything the production designer spent weeks agonizing over is gone.

CINEFEX: With the malleability of digital — both in the D.I. suite and at the visual effects workstation — it's now possible for filmmakers to massage a shot or a sequence to death. Has that become a problem?

TIM McHUGH: Absolutely. When it was so much harder to do things, and you weren't going to see the results for weeks, you had to commit to it. Now, the blessing and the curse is that you can see something right away and make a change. You can change it. The director can change it. The producer can change it. Lots of people make changes, just because they can.

HENRY LABOUNTA: It's been a problem in visual effects for quite a while — the directors know they don't have to final a shot until the very last minute. They can go in there and noodle the hell out of it — and that makes it difficult for companies to get the work done.

CINEFEX: All of this tweaking — is there a danger of making a shot too perfect, of losing the 'soul' of the shot, as Rob mentioned earlier?

ROBERT SKOTAK: I think so. There's an impulse to scrub the dirt out of shots, to buff and polish them, to perfect nature through the computer. But to make our shots feel more real and gutsy, we have to learn to live with the sloppiness of nature. I'm a fan of the ugly matte shot. Not an unacceptable matte shot, but a shot that is just ordinary, that doesn't call attention to itself. Or — something Jim Cameron has done in the past is to look for the not-perfectly-framed shot, catching an action that, because it happens so fast, you don't quite capture ideally. There was a nice thing in *Signs* — the camera comes through a window at a birthday party, and this creature kind of strides by, and you don't quite see it. It's a haunting shot.

CINEFEX: We used to hear the expression ‘happy accident’ all the time; but in CG, there are no happy accidents, because everything can be so perfectly controlled.

ROBERT SKOTAK: And that’s what makes it look wrong. A prime example is the shot of the elephant stepping on the car in Jumanji. It was technically brilliant, very well done; but, to me, there was something not quite right about it — and it applies to this idea of perfecting nature in CG. In the real world, with real rampaging, out-of-control animals, that elephant wouldn’t step on that car so perfectly. It might just step on the trunk, and the car might pop up and block the view of the elephant. A part of the car would fly off, toward the cameraman, and so he’d duck and the camera would suddenly move to the side.

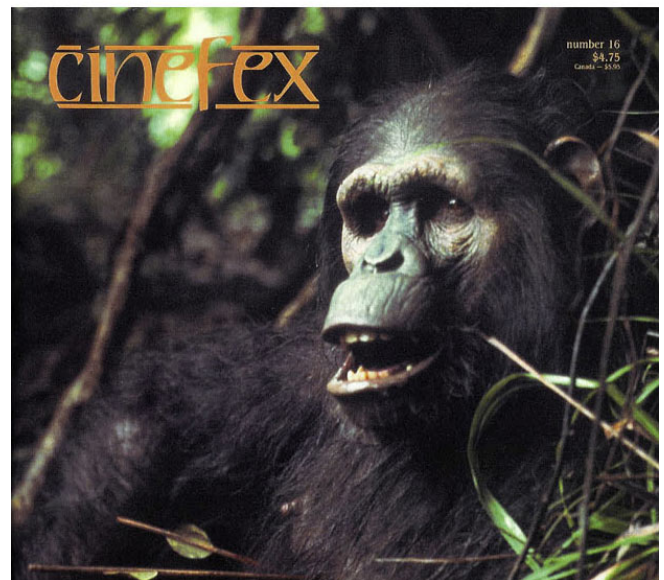
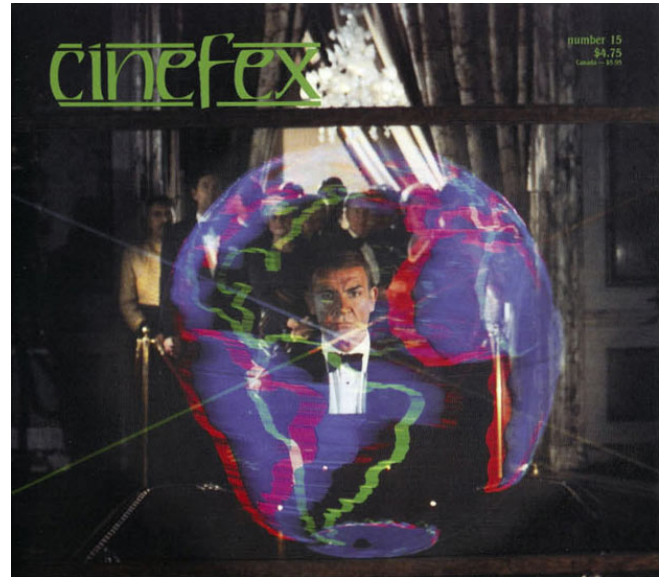
CINEFEX: Peter Jackson did that with the cave troll battle in the first Lord of the Rings. It really looked like a cameraman was running around with a handheld camera, trying to get this action while also ducking out of the way of the troll.

ROBERT SKOTAK: That’s the kind of thing we should be looking for.

JOHN VAN VLIET: I remember some of the early CG aircraft and spaceships. A lot of the people who had been shooting spacecraft models on motion control stages really hated the look of CG because it was so mathematically perfect. I’ve been on shows where we had both real aircraft and CG aircraft, and it was amazing to see the difference. In the real aircraft, this guy would be flying along in a so-called straight line, but he would do a hundred different calculations to keep the plane moving correctly. There would be all these little flaws. But if you told the CG airplane to fly from point A to point B, it would be absolutely precise, with no deviation. And it would look wrong.

RANDY COOK: It applies to character animation, as well. With the computer, you can move to a finer degree of incrementation than real skin, bone and muscles will allow. Consequently, we often wind up with animated motion that is smoother and more precise than what you see in nature — and that gives it a kind of fakeness. If you’re attempting to simulate life, you need to put in those idiosyncrasies and irregularities that you would find in an organic creature.

BRIAN VAN’T HUL: I think people are realizing that ‘flawless’ can mean a lack of style. So effects artists are throwing back in faults as a last step in their comps. ‘Okay, now that it’s all perfect, let’s mess it up a little bit. Let’s put some dirt on the lens, let’s shake the camera up.’



JOHN VAN VLIET: One of the software programs now has something where you can ‘add noise’ to a move. You can basically just add that imperfection all the way through. Somebody finally got it. Just the fact that people are now addressing that is a huge leap.

CINEFEX: Another component of over-massaging by directors — it seems they want their visual effects shots to be absolutely perfect; but some don’t apply that same standard to other elements of their film. They beat up the effects companies to get everything right, in support of a movie that clearly had a lot of shortcuts taken with the screenplay and other things!

JAMIE DIXON: I think what happens is — with live-action, you shoot your movie, you blow your millions of dollars, and you get what you get. And at some point, the filmmakers say, ‘The live-action is what it is, that’s all I’m going to get out of it — but this we can still mess with.’ On one of our projects we spent so much time noodling ridiculous details — truly ridiculous details. One of the most difficult things about filmmaking is the decision-making process. And it almost doesn’t matter how early you get started trying to solve a problem, because nobody’s going to make up their mind until about the last six weeks of the show anyway. The pressure of the deadline is an amazingly clarifying force.

PHIL TIPPETT: The fear factor really hits in postproduction, when the director and the editor are trying to make sense of what was shot — ‘Oh, my God, what have I done?’ And it’s not just the visual effects companies — everybody in the postproduction pipeline gets it. The further on down the line, the worse the intensity. Some people just don’t have the temperament or the organizational skills to do these kinds of big visual effects pictures, and everything falls apart at the post stage. And, you see it coming! You see it coming a million miles away!

CINEFEX: We’re now 15 years into digital effects technology. Is the initial excitement wearing off a bit? Is the pendulum swinging back, away from CG and toward more practical approaches?

ROB LEGATO: I think we’re swinging back to a point where people realize they don’t have to replace everything with a CG image. People are saying, ‘I’m going to shoot a real plate, then let the computer help me move it about the way I need for the shot’ — but not totally creating it, not reinventing the wheel. I don’t want to create a CG car if I don’t have to. I’ve done it, and it worked, ultimately. But man, it was a big deal to do. It took four or five weeks of, ‘I don’t know what the hell’s wrong with it...’ You’d never have to spend that kind of time on a set, shooting a real car. You’d have an instant visceral reaction as to whether it was working or not.

JOHN VAN VLIET: When I was on *Mortal Kombat*, the producers desperately wanted to do it all CG — like for lava flowing out of this one character. But, CG was the wrong approach for a number of reasons. It was wrong from a financial standpoint. Fluid dynamics technology really wasn't there yet. They would have been working on this thing for another year! But the guys who held the purse strings were just convinced that they had to have CG; and it was really tough to talk them out of it. We finally got them to go the practical route. We went in and plumbed up a couple of robots, and they looked great!

PATRICK TATOPOULOS: If you go back a few years, everyone was saying, 'We only want to do it CGI.' But now, there are new directors coming up — the young generation that you think would be partial to CGI because they were born into this world of videogames — and, strangely enough, these younger directors are pulling the other way. That's been my experience. I find it very interesting.

ALEC GILLIS: We're starting to get directors who like model spaceships, real explosions, practical effects. Of course, we're listening for what we want to hear, to a degree. But I do think directors are coming back to live effects a bit.

ROBERT SKOTAK: I've run into a lot of directors recently who have said, 'Is there any way we could do this non-digital? Because I don't like that look.' I see the pendulum swinging back to what it really should be — a mix of all these things.

NED GORMAN: If we learned one thing from Peter Jackson and the *Lord of the Rings* trilogy, it's that you can achieve great success by mixing different techniques. He used every trick in the book, and saved the digital punch for when he really needed it.

STAN WINSTON: He used techniques that we'd all seen before — just never put together in quite that way. He mixed up digital matte paintings, men in makeups, digital characters, miniatures. He had the vision to use those tools to tell an amazing story. You have to open up the toolbox and be comfortable with everything that is out there; but, as Phil Tippett always says, if you can do it with a hammer, use a hammer.

CINEFEX: Jim Cameron is another director who mixes it up. He's always been a proponent of using everything from high-tech tools to old, tried-and-true visual effects techniques.



VAN LING: That was one of the greatest lessons I learned from him. One of the phrases he always used was, 'horses for courses.' Use the right horse for the race you're going to ride. I've seen people dismiss the older techniques as quaint and old-fashioned. But it would be very sad to see the effects world become a world of computer graphics artists who consider themselves computer graphic artists, rather than artists who are willing to use any technique.

CINEFEX: Won't there be all-digital artists who rise to the top, who are artists in their own right, even if they work only in CG?

VAN LING: I wonder, though, if the technology doesn't make it more challenging for people to be artists. It can encourage laziness, because the art can be an automated process. You can buy software packages today for flying logos, for example, and all you have to do is swap out where your logo goes and choose one of a hundred preset motion paths. There's a lot of canned stuff, too — and you see it all the time. You can be watching something on TV — 'Oops, they're using Pyromania. They're using Pete Kuran's fireball explosions.'

TIM McHUGH: I find myself decoding the effects packages or plug-ins in effects movies all the time. 'Oh, they have the new hair plug-in that does that.' Or, 'Oh, subsurface scattering on the skin.' Or, 'Oh, they've got that new particle generator.' I sit there, knowing who worked on the movie, and I can tell you what software they own by seeing their effects.

VAN LING: There are a lot of people who just use the defaults. And that's not art. That's Chinese menu work — pick one from column A, one from column B, put it together, and you've got a shot. It's a struggle for the visual effects artist — especially the up-and-coming ones — to ignore all of that preset white noise and learn the basics of how to tell a story, how to fit a shot into the overall.

CINEFEX: As far as digital technology has come, what limitations does it still have? What tools do you wish you had in that toolbox?

JOHN KNOLL: Nothing is ever fast enough. Our render times have remained fairly constant since *The Abyss*! They're always at the pain threshold. If you look at how long it took to render one frame on *The Abyss* and what it takes to render a typical frame on the new *Star Wars*, they are fairly comparable. Of course, that's because we're doing far more complicated renders — denser, with more sophisticated shading models. If we had tried to render that back in 1989, it would have taken a month to do what we're doing in an hour now. But people are always trying to figure out a way to make the process faster. Faster is always better.

JOHN DYKSTRA: It's still really tough to do random stuff in the computer. The computer doesn't like to do random stuff; it likes to do organized stuff. So that's a limitation — even when it's done really well. I was astonished at the work in Pearl Harbor. I thought the explosions, fire and smoke were phenomenal in that movie, some of the best-looking procedural stuff I've seen. But it is still really hard to make that kind of random stuff — water, smoke, clouds, fire. Those things are a huge challenge for digital imaging.

ALEX FUNKE: There's also no good digital lighting program. Software designers have never sat down with real cinematographers and said, 'Okay, let's see how you do this and let's design a program that actually works the way the cinematographer lights.' We're way behind on that.

ERIK NASH: Given the complex nature of CG lighting and how non-intuitive and non-interactive it is, I don't know how the artists do what they do. Artists who really understand how digital lighting works do remarkable things with tools that don't mimic real-world lighting tools in any way, shape or form! It's liberating, in that you can do things you could only dream of doing in the physical world; but the non-interactivity of it, to me, would be very frustrating. That's the one aspect of it that still seems incredibly arcane — how slow it is to see what it is you're really doing when you're lighting a CG object.

RICHARD HOLLANDER: That's what we need — a way to realistically light environments and get results that don't take 40,000 years to render. It seems to me that if I was to put a synthetic creature sitting next to you in this room, since the lighting is not changing for all of our shots, no matter where my camera is, there shouldn't have to be too much human intervention on the lighting of that creature. We are striving for that. We want to understand this room from a light-sourcing point of view — and we want that to happen fast. That's the next layer — to light shots 90 percent semi-automatically, then tweak the rest.

CINEFEX: It seems like lighting, since it is physics-based, ought to be something that could be proceduralized fairly easily.

ERIK NASH: Yes, it can all be quantified. The problem is just the complexity of the calculations, the number of calculations necessary to mimic what happens in the real world. All



of that is so staggering, to be able to run that simulation in anything approaching real time is just currently beyond the realm of possibility. But, as computer power grows, interactivity will improve in leaps and bounds.

HENRY LABOUNTA: The past couple of years at Siggraph, it seems like more than half the presentations are about real-time issues. The stuff Nvidia is doing with Gelato is brilliant. It's a whole new package they've come out with that is basically intended to do RenderMan-style rendering in real time.

PHIL TIPPETT: That would be ideal — to be able to go in and manipulate a thing with all of the lights on it, in real time. When I was doing stop-motion animation, I found that lighting had everything to do with how you moved the character. And when you're dealing with a wireframe thing, you don't have that. You're just dealing with movement in the abstract until you see the thing rendered out.

RANDY COOK: That's the biggest disadvantage in computer animation, versus stop-motion or some of the older techniques — you don't see what the light is doing as you are animating. On *Lord of the Rings* we tried to get our lighting setups as soon as we could and incorporate them into our work. We also suggested lighting positions, so that our character's face would 'find the light' at the right moment. But most animators today don't get to do that. They're not allowed access to that part of the toolbox, which is unfortunate.

Rob Coleman: I think we're going to have that real-time rendering in the next three to five years. It may not have every level of specular highlights, or subsurface scattering or all of those beautiful things that they do to make realistic skin these days; but it would certainly be good enough for me to judge the animation at a level beyond what we have now.

CINEFEX: We'd like to get your take on previzualization. What is the role of previz in visual effects now?

IAN HUNTER: In some respects, previz is a way to get some of that lost preproduction back into the schedule. If you can sneak that in by calling it 'previz,' and everyone thinks that's a sexy term, that's great. It's just preplanning, which you should have been doing in the first place.

ROB LEGATO: If you do it correctly, previz allows you to go through the mechanics of a scene beforehand and solve problems that would be harder to solve later. It gives you a sense of rhythm. You can cut something together with music and sound effects, and it starts to feel like a movie. It makes you a better director, because it gives you a couple of cracks at directing a scene before you actually have to shoot it. I think, in the future, we're going to have a previz artist on all productions, as a matter of course. People are becoming more dependent on it.

ERIC BREVIG: I think previz is the best application of digital technology we have in the movies. Effects are so expensive, if you can save the slightest misstep by solving a problem in a cheap video animatic, it's a great thing. Especially when so much of your shot is synthetic. Unless you have this road map of what the shot is supposed to look like when it is done, you can't go out and shoot any of the elements. If you're doing a big orbiting helicopter move around something you're going to put in later, you'd better have some indication of what the shot is supposed to look like before you shoot live-action. Animatics are very important — if the director sticks to them, of course.

CINEFEX: Has previz extended beyond its initial purpose?

COLIN GREEN: It has changed a lot. Initially, previz focused on addressing technical challenges. How big of a greenscreen do we need? Is the crane long enough to get the shot? And we would do some creative development in the midst of that to see what it all looked like. Now, we're doing almost exclusively creative previz. The technical questions aren't even asked until the very end. It's there purely to define the visual approach.

CINEFEX: Is previz generally accepted now? Or do you still have to sell the concept of doing it?

COLIN GREEN: Early on, we'd have to do a lot of explaining about what the benefits were. Now, people just come to us, and say, 'We need previz,' and we have to ask them: 'Why? What are you expecting to get out of it?' The term is thrown around for a lot of different things. But we always make sure that the process doesn't evolve into some sort of fluffy eye-candy phase at the beginning. We want to make sure it is a decision-making vehicle for the director and crew.

CINEFEX: From the standpoint of effects work, is previz always a good idea?

MATTHEW BUTLER: I see both sides of the coin. On the up-side — if I was a director, I would want previz, because I could cut it right into my movie, and it would help me plan. Given a choice to previz or not to previz, I'm sure every director would say, 'Sure, let's do it.' The down-side is the exhaustive resources that can be spent on it. Previz can be endless. Your resources are limited, and it can be a negative thing to spend some of them — a lot of them, in some cases — on previz, leaving you with fewer resources to do the final work.



JAMIE DIXON: We suffered badly from over-previsualizing on Riddick. We were noodling shots forever in the previz stage. It killed us, because we couldn't get things signed off, and we wound up wandering all over the place.

CINEFEX: So, instead of acting as a quick-and-dirty intermediate step between storyboards and final shots, previz can be abused a bit.

MATTHEW BUTLER: That's a good way of putting it. Previz needs to be something that's turned around quickly and is done in a disposable manner. Often, directors will say, 'I can't judge a shot when it is done at that low a level — I need to see it more fleshed out.' And I understand that, in some cases. In other cases... For example, how do you previz a volumetric rendering of a cloud? It is so abstract, the previz is useless. So you've spent all this time previzing a cloud, when you should have been doing the final shot. You can wind up in a situation in which you've used up nearly all your time and money — and all you've done is previz.

CINEFEX: If you previz in-house, you risk wasting time and money. But if it is done somewhere else, at a place that specializes in previz, doesn't that take the visual effects people out of the creative loop?

COLIN GREEN: I'm sure that's perceived as a problem occasionally by the visual effects companies; but if you approach it in the right way, vendors that get involved later are generally quite happy to get the data we've created. If that process is done with good, open communication, and you hand over solid, usable assets, everyone is happy.

MATTHEW BUTLER: It's the director's dream anyway; and if that outside previz company is getting what is inside the director's head into the previz, it just gets you further along. But if you are completely locked to the previz, then you might as well not do the show — because, what are you offering? We are artists and technical experts, and if you take too much away from us, you are being inefficient. You're hiring an expensive place like Digital Domain, but not letting us do what we do well.

JAMIE DIXON: Another thing that can happen is, because the previz artists are working at such a fast pace and experimenting with things, you can end up with a tangled mess of details that is very hard to manage when you actually get into a shot. Stupid little technical things, like maybe you cheat a camera move because it looks all right in the previz — and that's all that matters when the director is standing over your shoulder, saying, 'Yeah, that's great.' But then, the animators doing the final shot get saddled with that mess.

CINEFEX: Presumably, if the effects supervisor is involved in the previz process, he or she can keep that from happening.

ERIC BREVIG: I get involved, as needed. I lay down some rules, because I'm going to have to go out and shoot live-action to match whatever it is they're creating in the previz. They can't use imaginary cameras that I could never use, for example, or mix focal lengths in the same shot.

ANDY JONES: It's essential to have people doing the previz who are really good with cameras; because if you don't, they'll animate the animatics in strange ways, and it will start to look very CG. A lot of camera work can be established in previz — but it is important to develop camera work that is actually going to be possible on set.

JEFF OKUN: Sometimes they give you an effects shot that they've created, and you look at it and go: 'Whoa! You want this? The perspectives are wrong. It looks good here because of the low-resolution, but when we do it big, you're going to see a problem.' But they make you put it together that way, and then they yell at you because it looks like crap. Those 'cheap' shots can end up costing a lot of money if you are frame-by-frame matching. Fortunately, some directors do realize that previz is only a template.

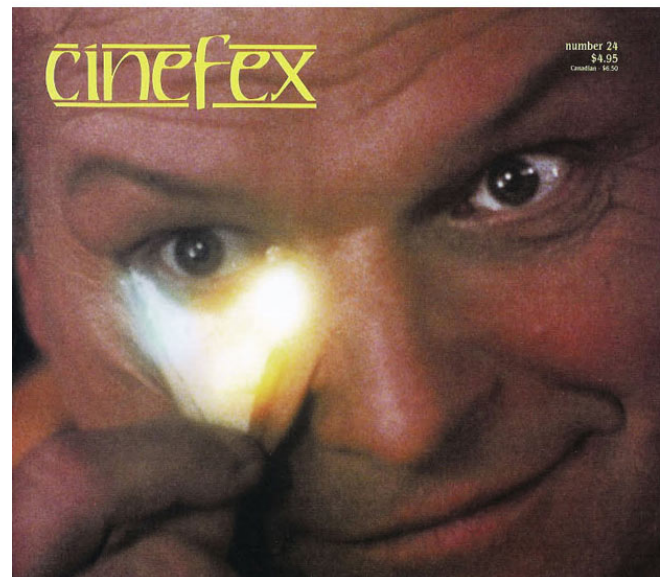
JOEL HYNEK: The directors who use it best are those who realize it is only a departure point — they have the option of using it or not, and going from there. That's how Rob Cohen uses it. He loads the previz on the day, and says, 'Okay, that's what I want to do,' or 'Nah, that's good, but we can do better,' and departs from that.

CINEFEX: Any other good applications of previz?

PADDY EASON: It can be a sales tool, if the effects work hasn't been awarded yet. On *Big Fish*, we mocked up some previz of an airplane flying over a nighttime Korean landscape, with guys jumping out and parachuting to the ground. We offered that up, and the production liked it; so we just worked the previz out, and it became final rendered stuff that's in the movie.

CINEFEX: Is that happening a lot — taking previz files directly and using them as the basis for final shots?

COLIN GREEN: We've done sequences where you can almost superimpose the final on top of the previz and not see a significant difference.



NATHAN McGUINNESS: I think it's great when you can take the previz and move it into the actual shots. It's the same artist working on the previz who's working on the final shots, which keeps you from wasting time.

MATTHEW BUTLER: It seems like a good idea to use the same package for the previz that you are going to use in the final animation. It seems like a good idea to use the same artist to do the previz and the final shot. But, again, is that an inefficient system? Is the artist who is doing the final shot necessarily the best previz artist? I don't know. It's a conundrum. It's like Communism — in theory, it sounds great, but in practice, it isn't very successful!

JAMIE DIXON: I think it's safer just to treat previz as this completely disposable thing. Do it quickly, get the idea you need, get the basic timing that you need from it, then sit down and do the shot for real.

CINEFEX: Previz is also sometimes used on set as a through-the-lens visualization tool — to help directors, actors and camera operators on a bluescreen stage see the physical geometry of a digital set. How valuable an application is that?

ALEX FUNKE: Certainly, if a live-action sequence is being done where large amounts of digital set are being incorporated, it is tremendously valuable to be able to see what the final composite is going to look like. But I would be reluctant to say to the camera operator, 'Here's the previz, and this is how we have to shoot it' — because, that operator is an artist. The previz may be a good guide, but why do we have this accomplished camera operator if we're going to tie him down to a digital image?

COLIN GREEN: The main backlash we've had from the beginning is that seasoned grips and camera people are quick to say we don't know how to do what they do. If we have a digital crane in our previz, for example, their attitude is: 'What do you know? How many cranes have you pushed around on set?' So we have to present ourselves as humble problem solvers, rather than dictators, dictating the way a crane gets used. But once we've created that relationship and they realize that we can help them solve problems, we become a good resource for them.

CINEFEX: Do studios ever use previz as a feasibility study, to determine whether or not to greenlight a film?

COLIN GREEN: That's definitely increasing. Studio people and investors want to see what's special about a project, and previz is a tool that can help showcase that earlier in the development process. Ideally, we'll get to a point where we'll make a totally CG movie for packaging purposes; and then the studios will be able to decide how they want to develop it — as a live-action movie, CG movie, TV series or game.

CINEFEX: What about 'post-viz' — a term we're hearing more often lately?

COLIN GREEN: We're getting involved in that more and more. There are sequences and elements that have been shot — but how do you design and develop the cut when 80 percent of the screen is green? We fill in the green parts, so they can tell the story and cut the sequence.

CINEFEX: So previz is no longer just a preproduction tool. It is being used in production, all the way through postproduction.

COLIN GREEN: Yes. For Matrix, we were involved up until the last phase of postproduction, continuing to tweak things and generate new ideas.

KEVIN HAUG: On Panic Room, David Fincher wanted to previz the entire movie — to literally previz every single shot as an experiment in another way to make movies. Had everything gone according to plan, he would have been able to shoot really fast, because he would have already prevized every shot and cut the movie. He could have walked down to the set, and there would have been markers on the floor where every setup was going to be, and he would have been able to just go from one to the next with the actors — especially since this was a house and, presumably, everything would be lit the same.

CINEFEX: Interesting idea.

KEVIN HAUG: It didn't work out, for a number of reasons. But I think that, on some level, Panic Room is a watershed visual effects movie that will never be seen as a watershed visual effects movie. It did things that have reverberated out into other movies. And I think the standard for what to do with previz changed irrevocably on Panic Room. It was no longer good enough to do previz just to show the director what he might get in his effects shots some day. It has to be something that's useful to the grips and the AD and everyone on set, or there's just no point.

CINEFEX: Let's talk about motion control. When Cinefex first started publishing, motion control was the hot new technology. Twenty-five years later, it seems to be waning as an effects technique. Given the advances and elegance of new tracking software, is there a future for motion control?



ERIK NASH: I think the frequency with which motion control will be used will continue to decrease, as it has over the past ten years — but I think we still need it. One place where motion control will continue to be used is in twinning situations, where you've got one actor portraying multiple parts.

JOHN DYKSTRA: Or if you want to do a splitscreen, where a raging fire is on one side, and a highly paid actor is on the other, and you want to make the two appear as if they are a foot from each other — motion control works great for that. If you're going to shoot miniatures in multiple passes and then combine them in the composite, motion control is a terrific way to originate those elements.

ERIK NASH: There are also offshoots of motion control that are going to play bigger roles. On *I, Robot*, we used Joe Lewis' Encodacam system, which uses a Kuper computer and encoders on the camera crane and camera head to feed positional information into a 3D package that renders a virtual set real-time. As virtual sets become more and more a standard part of the filmmaker's toolbox, being able to frame shots on set and replace that blank greenscreen with at least some representation of what will ultimately be there will become absolutely mandatory.

KEVIN HAUG: A classic example of what motion control can do these days... I was walking out to the set on the second reshoot on *Panic Room*, and the three motion control guys we'd been using off and on throughout the show were walking towards me. 'What are you guys doing here? I didn't bring you in today.' But they weren't there for visual effects, they were just doing a move. David Fincher had decided that he could previz, export the move, have somebody come in to slap the motion control track down, and then already have the move plugged in so that once he'd set up point A and point B, the move would work just like it did in the previz, and he could start tweaking it.

JOEL HYNEK: Motion control definitely has deviated from its traditional role. I just got off a fairly elaborate setup for *Stealth*, where we had the front end of our futuristic airplane on a gimbal inside a huge greenscreen stage. We shot the gimbaled airplane with the actor in it, sometimes using shots that were based on our previz. And then we flew our Spydercam in real time as the plane went through its gimbal motions to get a sense of actual flying shots. We knew that most of the plane was going to be replaced with CG, but this gave us a way to get the actor actually moving and reacting to forces. And the whole setup was driven from a Kuper system.

CINEFEX: Going back to its more traditional uses — what are the disadvantages of using motion control as it has been used for the past 20 years?

JOHN DYKSTRA: Well, it slows things down. If you are shooting a page and a half a day, bringing in motion control equipment can take that down to three-quarters of a page — and that's a big deal. An expensive deal. So, I tend to track after-the-fact. If I can give filmmakers the flexibility to shoot, to point the camera wherever and however they want, and then track it afterwards, why wouldn't I do that?

GRAY MARSHALL: But if you can get it to work in the production flow, motion control can be a much more cost-effective way to do things. There are now systems that don't require a separate team — a motion control equivalent of a HotHead. These systems allow the regular camera crew to integrate it as part of their package, just as they would the rest of their technical camera gear.

JEFF OKUN: I'd much rather have motion control on the set. But, sadly, it is perceived as slow and cumbersome by the people who pay the bills. Maybe if we came up with a better term for motion control — 'real-time digital replication' or something...

MATTHEW BUTLER: One thing I love about motion control is that you get the approval from the director on the set, and there is no argument. That's better than the incessant tinkering that can go on in post. So, motion control has its advantages for us in that regard; but, in terms of what can be done synthetically, after the fact, sure, virtually anything can be tracked.

ALEX FUNKE: A caveat to that, however, is that you must have very good on-set documentation. Postproduction tracking is only as good as the surveys that are done on stage. We can get rid of the motion control and the tracks and all of that stuff, and do it in the computer — but we've still got to have that accurate documentation of the structure of the set.

MATTHEW BUTLER: Lens mapping makes a huge difference, too. Typically, a crew will shoot with the same set of lenses, and there can be significant defects in them. If you can get your hands on those lenses, you can actually record barrel deviations and make a remarkable improvement in your matchmoving — because the real camera and the digital camera are the same.

CINEFEX: Has post tracking become relatively easy? Or is it still a somewhat painful process?

PADDY EASON: It's become much easier than it was, particularly with the advent of software like boujou. Things that previously would have taken weeks to address can now be done almost as a matter of routine, in a few hours.



BRIAN VAN'T HUL: And, knowing that tracking isn't going to take up a huge amount of time in postproduction, people feel more free when shooting plates. I'll often offer up handheld to a director on set; whereas, in the past, that's the last thing any visual effects person would offer.

ERIK NASH: On *I, Robot*, the production team insisted that there would be no motion control on set. We didn't quite make that; but for all of the robot shots we did at Digital Domain, we derived camera moves 100 percent through image-based tracking. We have a great piece of software and a great system in place in terms of surveying the sets, and then tracking from the images to sort of reverse-engineer what the camera did. That became the foundation for all of the set extensions and CG character work that followed. It's become a key part of our entire process, being able to derive camera moves from the images themselves, without any sort of encoders or motion control stuff on stage. It means we can do Steadicam shots, handheld shots — you name it.

CINEFEX: Will matchmoving and tracking continue to get better? Or is it as good as it's going to get?

ALEX FUNKE: I think it is just in the Model-T stage — competent, but not a Ferrari. There's a lot to be done, and a lot that is being done. The only way to make it better is to get it out in the field, use it, then listen carefully to what the users say.

RICHARD HOLLANDER: Tracking software is still on its ramparts — it hasn't reached that plateau yet. There's an awful lot of information in that picture in a single frame, and we're only using some small percentage of that information for our 3D tracking. So the tracking gets you part of the way, but then you still have to fudge it. I measure the success of it by how many times it has to go back. It is too often, still — and we have a pretty good record in terms of tracking. How about getting it right in the first place, so you don't have to fudge it?

CINEFEX: One of the things that the virtual camera has introduced to movies is the 'impossible' camera move — moves that could never have been done with a physical camera. What are your thoughts on this new style of camera movement?

PHIL TIPPETT: I think it's a trend that's going to date everything. We'll look back on this stuff in probably less than 20 years, and we'll have a similar experience to looking back at the 1925 *Lost World*. There will be various levels of skill that we can appreciate, but we'll see the technology for what it is.

ALEX FUNKE: It's analogous to doing a camera move on a miniature that is impossible on a full-size set — at some level, the audience is pulled out of the story because their brain is going, 'Wow — how did they do that?' And if they're thinking, 'How did they do that,' they're not thinking about what the director is trying to say.

VAN LING: There's this whole 'because we can' technological imperative. 'We can fly the camera from here to anywhere, so let's do it.' People love doing powers of ten shots, doing snap-zooms into microscopic views, and so on. Those are all great techniques, but they can quickly become cliché. The first time you saw bullet-time — amazing. But before long, you started seeing it in every commercial, and it didn't have the same impact.

Rob Coleman: Putting the camera inside the computer has completely changed the look of filmmaking. Years ago, you'd have to cut around an action sequence because you had a stuntman doing some things, and then you would go to your main actor — you were forced to cut. Now, you can do a morph from your digital double to your main actor right on screen, while the camera is moving 360 degrees around him. But is that always a good thing? Have we forgotten the roots of filmmaking? When I see student reels, it's the camera work that drives me insane. There is no understanding of the camera, and some of that has crept into films.

TIM McHUGH: I get demo reels from animators — and they're videogames! They're not visual effects shots. They're robots skating down the hallway blowing things up. They're all first-person shooter kind of demo reels.

CINEFEX: Perhaps it's a generational thing. It bothers the older generation, but not the younger one. In the 1930s, visual effects shots had to be locked-off. If there'd been camera movement in those shots, the 1930s audience probably would have been freaked out.

ERIC BREVIG: That's a good point. They wouldn't have been able to process it, because it wasn't part of their visual vocabulary.

CINEFEX: So if this unrestrained camera is the new look, is there any reason visual effects artists need to have an understanding of traditional art, composition and photography techniques?

HARRISON ELLENSHAW: Well, yeah. Not to be an old curmudgeon about it, but a big part of my training was taking photographs, understanding field of view, different lenses, different sizes of negative, perspective, horizons, vanishing points. I was lucky. I had a mentor, Alan Maley, who was really good at all of that stuff. You must have that basic knowledge — at least to



make a matte painting look right. There's no slider that says, 'Good Composition — Bad Composition.' And composition is so much a part of it.

BILL TAYLOR: One of the virtues of the old, locked-off matte shot was that the composition was static. So the composition could be designed to lead the eye toward the important elements of the scene — toward the live-action if the live-action was very small in the frame, for example. Whereas, in a moving shot, especially a shot that's moving in 3D, the composition is changing constantly.

HARRISON ELLENSHAW: Composition is becoming a lost art. There are a lot of people at the entry level, and above, who just don't know what the hell they're doing.

CINEFEX: Are the rest of you noticing a general ignorance of these principles among some CG artists?

KEVIN HAUG: Oh, yeah. There's not a show that goes by where I don't have to tell a 3D animator why what he's done doesn't work, because he doesn't understand the rules of perspective. Once the software cheats the perspective for them, they never learn it. I rarely get aggravated at animators, but the first time this happened, I got aggravated. It was a guy who was a hotshot in the video world and he was pulling an arrogance trip on me, and I finally said: 'You know, they worked out all the basic rules of perspective in the 15th century — how did you fucking miss it?' When you find an animator who is getting paid that kind of money and doesn't know the first three rules of perspective, you want to smack him.

JOHN KNOLL: It used to be that just about everybody in the business spent some time out on the stage, shooting stuff. But I see a lot of people doing work in visual effects now who have never had any real experience with cameras. I think that people who have never had that experience, have never had to make the tough call about where to set the exposure on something, tend to put together unrealistic composites. You'll see an interior with a window to a daylight exterior, and they'll make the outside the same brightness as the inside. If you've ever tried to do that for real on a location, you know it's really hard to make that split. Another thing — there isn't infinite depth of field. So you see mistakes like a sharp background that should be soft.

CINEFEX: Some people defend those things as 'artistic choices.' They'll do something that is patently incorrect from a photographic point of view; but their view is that those rules don't apply anymore.

JOHN KNOLL: Well, that's a choice. But my feeling is that if you do something you couldn't do with a real camera and a real object — a camera passing through the propeller of an airplane, or a shot that booms from a thousand feet down into a closeup in a second — that is going to stand out as fake.

BILL TAYLOR: It depends on how it fits in dramatically. You can do an impossible shot in the course of a very tightly cut, fast-paced car race — such as shots we did in *The Fast and the Furious* — and it doesn't stand out. There's a shot in the race that is literally impossible. We got in between two cars, when there was no way we could have put a camera operator — or even a robot camera — in that space. If we had done that same shot out of that context, people would have said, 'Wait a minute — where was the camera operator, and how is it possible for a car to go within two inches of the lens on the left side, and then an instant later go within two inches of the lens on the right side?' But it doesn't stand out in the context of that race sequence.

JOEL HYNEK: That's the trick — you have to be so involved in what is going on in the movie, you're not even aware of what the camera is doing. Even if it's doing something that could never be done for real, you don't really take that in.

JOHN KNOLL: I'm just not a fan of things that couldn't be done for real. When I'm doing a digital shot, I think about how we would do it if we were really shooting it. Would it be a helicopter shot? A crane? A car mount? Okay, if it's a car mount, there would be vehicle vibration on it, so we should put some low-amplitude, high-frequency vibration on the shot. Okay, this is a helicopter shot, which means you can't get too close to the subject, so there's got to be a long lens, and there's got to be a little float as the operator tries to follow the subject. Those little things add a lot of realism to a digital shot.

CINEFEX: Overall, would you say there is an ignorance of film history among some of the newer effects artists?

RICHARD EDLUND: Yes. A lot of the people who come into the visual effects arena these days are not sufficiently schooled in filming. They need to go back and look at historical movies. There are fantastic shots in *Metropolis*, *Citizen Kane*!

JEFF OKUN: To a lot of them, the history of visual effects is *Star Wars*. But *Citizen Kane*, *Gone With the Wind* — some amazing stuff was done in those movies from the '30s and '40s. It is my firm belief that if you understand those old techniques, then you can use new digital techniques more effectively. A lot of the visual effects supervisors out there today don't understand glass



shots. They don't understand throwing a piece of tape across the lens and doing two passes to get an in-camera composite. Nobody coming up today has ever worked in a darkroom. Whenever I do my little speaking engagements, I always ask — and nobody in the audience has ever touched film. They don't know what sprockets are! I guess it's not mandatory to know that; but I always take film with me, rip off pieces and pass them out, just so they'll know what it feels like.

ALEX FUNKE: I think all digital artists should go out and shoot film, and then study it — 'Oh, I get it; that's what happens with a highlight that's three stops overexposed.' They can be the most brilliant keyboard-and-mouse artists in the world, but they still need experience with real photography and the way film and images work.

IAN HUNTER: One of the common things that happens with people who are looking at monitors all day is that they have no sense of depth, no understanding of the simplest things like, 'Those mountains in the background should be lighter than the mountains in the foreground, because they're off in the distance.' To know that stuff, you have to be a keen observer of the real world, a participant in the real world.

JOHN DYKSTRA: You know what I did when I started out? When I was working at Doug Trumbull's place, we raced motorcycles, flew airplanes, flew gliders, we sailed, we surfed — you name it. We were out in the world, doing stuff! And we brought all of that real-world experience to moviemaking — as opposed to trying to make up a real world based on what you know about movies. Now, I'm not saying people have to go out and ride motorcycles. But you've got to know about the real world. You've got to figure out — is this table hard wood or soft wood? Is this part glass or plastic? How can you tell by looking at it from here? How does it feel? You need all that tactile experience. Learn how to use a camera, how to compose, how to use color and light in the real world, sketch, paint, force yourself to cross-train — all of those things bring verisimilitude to digital images.

CINEFEX: Once this generation of visual effects supervisors retires, is the whole film aesthetic going to disappear?

JOHN KNOLL: Who knows? It may not be a bad thing. I'm sure the generation before me winces at some of the things I do...

DENNIS MUREN: The early CG guys here at ILM who ignored the film aesthetic entirely quickly found out that they wouldn't be employed very long — because the directors at that time wanted that look. But I'm talking five or ten years ago. Now things seem to be drifting into a new direction, where it's okay to have a CG, non-photographic look. So maybe those early guys were just ahead of their time. We've had a lot of guys leave here to go work for the gaming industry, because their sensibility really is more in that world. Why be hindered by a background being out of focus? They see that as a problem. Whereas I see — aesthetically, it is a wonderful thing to use, because it focuses your attention where you want it. Their interest is more in just an assault of information. And my interest is more on focusing your attention for a moment to help the director tell his story.

CINEFEX: Just as the virtual camera can do impossible moves, the ability to do digital doubles seems to be encouraging ever more fantastic stunts — not only by superheroes, but by supposedly mortal, human characters.

DENNIS MUREN: Part of that comes from directors who are accustomed to playing games where the rules of reality are gone.

CINEFEX: We hate that.

DENNIS MUREN: I don't relate to it either — but we're getting old. And as our eyesight goes, what difference will it make? (laughs)

CINEFEX: But don't these kinds of unreal digital double actions make it harder for an audience member — no matter what their age — to empathize with the characters?

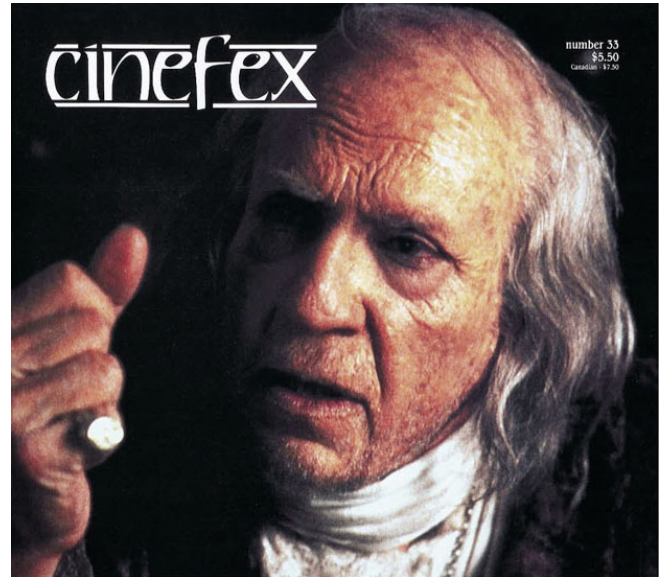
Steve Begg: I think so. I strongly believe that digital doubles have had a negative impact on action sequences, in that regard. When you see someone defying the laws of gravity and physics — which we've seen a lot in recent productions — I think the public feels as if it's being cheated.

ALEC GILLIS: To get involved in a film, you want your character to be an underdog and to have slim chances of overcoming his obstacles — but when he can overcome anything, I'm sorry, it doesn't work. In the last Matrix movie, there were hundreds of Agent Smiths fighting with Neo. Interesting concept. But then they fight and they fight and they fight, and pretty soon it is clear that Neo is indestructible and the Agent Smiths are unstoppable — so why are we watching this?

ERIC BREVIG: And, at the end of it, Neo just flies away! Why didn't he just do that to begin with? What — did you just remember that you could fly?

TIM McHUGH: I saw The Bourne Identity last weekend. In one scene, Matt Damon grabs this guy, throws him down a stairwell, and rides him down six stories, while shooting. I stared at it in disbelief. This was a realistic, gritty, spy drama — and here's a scene that wouldn't have worked in a Roger Moore Bond film! And I thought, 'Well, now I don't trust these people for the rest of the movie.' It was ludicrous. Now that anybody can do that — the Olsen twins can leap tall buildings in a single bound — it takes some of the magic out of it.

ERIC BREVIG: Same thing in Crouching Tiger. I loved that movie, but it bothered me that there were no rules. The characters could just float up to the ceiling whenever they wanted.



Well, if people can float up to the ceiling, they should just do that! They shouldn't be walking around getting into fights to begin with!

RICHARD EDLUND: But, at the same time, you could buy these gazelle-like people leaping up on walls and doing all these impossible things because they were staged well. If it's staged well and looks good, I'm more apt to buy it.

CINEFEX: That was obviously a stylistic choice in a very stylized movie. But why are we seeing so much of it even in supposedly realistic movies, like The Bourne Identity scene that Tim mentioned?

ERIC BREVIG: I think there are two culprits. One is someone just not thinking through the laws of physics. It's expensive to run physics simulations on digital doubles and make them look as if they are really getting banged up and all that. It's a lot easier just to animate them the way you think they would probably behave — but that has a tendency to look wrong. The second is the director who insists his character would survive a fall from a ten-story building. Hulk was a good example. Hulk could jump half a mile — and I don't think anybody other than Ang Lee thought that was a good idea. But that was his vision.

Rob Coleman: Directors are always asking animators to make CG characters do these physically impossible things — things that, in reality, would rip their shoulders out of their sockets. We're all dealing with directors who are telling us, 'I know no one can do that, but I want to see it!'

ROBERT SKOTAK: And even your average moviegoer who might think these things are impressive knows it's a digital effect. It's like a cartoon. It's like Wile E. Coyote getting flattened, and then showing up in the next shot okay. It makes these films dramatically lightweight, and it calls attention to the fact that this is an illusion, done with machines.

CINEFEX: Right, it's the magician giving his trick away. Instead of doing something that is photoreal and believable, you do a handoff from a real actor to a digital double doing something a person couldn't possibly do — and so the audience knows it's a digital double.

Rob Coleman: Believe me — if I can speak for all the 'magicians' here — we hate it when we are pushed to do that. It comes from directors wanting to see something 'they haven't seen before.' But when a character breaks the laws of physics, you are breaking the illusion. Nobody is going to believe in that character if he does these amazing things. And, worse, they are not going to believe that character is in peril. If he can leap 65 feet from one building to another, he is no longer like us, and we can't empathize with him. We have a bit more leeway in a Star Wars movie, because it's a fantasy and our characters are Jedis and we don't know the extent of Jedi powers. But I think they have leapt around too fast in the previous movies; and George is sensitive to that now. I think the idea with digital doubles used to be, 'If we get them across the screen faster, people won't notice that they're digital doubles.' But we've found that if we slow them down, they're more convincing.

CINEFEX: There's a psychological element to the obvious use of digital doubles, as well. Does a stunt sequence have the same impact on an audience when they know that real stunt people didn't do it?

ROBERT SKOTAK: Probably not. There's no balls to the CG stunt, no real danger. It's not a guy who actually went off a cliff in *The Spy Who Loved Me*. It's just something that was done on a machine very similar to what's sitting on my desktop at home. So, yeah, it loses a certain amount of awe and impressiveness.

NICK DUDMAN: The audience has been completely desensitized, in my view. When you saw a stuntman slide down a wire between two jets in *Cliffhanger*, you could tell it was a human being doing it, and you felt exactly the same exhilaration that you feel if you go to the circus and watch somebody walking along a tightrope. The minute you take away the angst of that, then what is happening to the people on screen has less importance to the audience.

PADDY EASON: Think of the criticism of the last few Jackie Chan films. A lot of fans were disappointed to see any CG effects in a Jackie Chan movie, because they felt his main selling point was that he did all of that for real, and there was real physical danger to him. That has been his selling point over the years. So, when any hint of a bluescreen or a wire removal comes in, they feel short-changed.

MATTHEW BUTLER: The studio publicity on *XXX* implied that Vin Diesel did all his own stunt work, because they knew it would disappoint the audience if it came out that stunts were performed by a digital double.

ERIC BREVIG: I'd rather see somebody do something that is half as dangerous, but they really did it and you can tell, than see the best, most amazing feat performed by a synthetic double. If you use a digital character and the audience isn't aware of it, they will still get that rush of, 'Oh, my God, somebody really did that.' That's fine. But if you push it and forget you are trying to fool someone...

CINEFEX: Is there a similar danger in the use of crowd replication? Will there always be more impact in seeing Lawrence and his men storming Aqaba than there is in seeing a CG army storming Troy?



CRAIG BARRON: I thought the work in Troy looked pretty good. But you're comparing Troy to Lawrence of Arabia, one of the best movies ever made! And that Aqaba shot resonates because it was the focal point of the whole picture — the audience got to see how the big guns could not be turned around from the sea. If David Lean were making films today, he'd be using digital visual effects!

ROBERT SKOTAK: I don't know — there's just something about Cecil B. DeMille getting up there with his bullhorn and yelling at 10,000 people.

CINEFEX: Movies can't afford to do that anymore.

ROBERT SKOTAK: Money is a problem — but there are still times when you want real people. So pick your moments. Instead of staging such a huge battle, you stage a battle where the individual encounters are so striking, so interesting, so horrifying, you don't have to do the whole thing. Maybe you have 1,000 people instead of 10,000, and you stage most of it with them. That could be more compelling than seeing thousands and thousands of synthetic people to the horizon.

ROB LEGATO: You put 50 people in a scene, maybe I buy it. You put in 500 — now I know it's a trick. You put in 10,000, forget it! I've lost the impact of knowing it is real. It's no longer this big David Lean production value. It doesn't mean anything to me anymore.

ALEC GILLIS: I am personally tired of seas of armies running across the battlefield and crashing into each other. It's desensitizing and it's boring. I had the same reaction to one of the earlier Star Wars movies, where there was a sea of TIE fighters coming towards you — okay, now they've just gone too far.

Rob Coleman: But crowd technology has allowed us to have epic pictures again. Those army shots in Troy really worked. The battle of Helm's Deep in Lord of the Rings — oh, my God! There were a couple of shots in Return of the King where I actually gasped. The shots of the Riders of Rohan coming up to Minas Tirith, with that huge army out in front of them — my brain was telling me 'visual effects,' but it didn't matter. It literally took my breath away.

CINEFEX: How do you extract that aspect of ‘obvious CG’ in shots like that, so that the audience can look upon those crowds and get the same feeling they got from the old DeMille or David Lean movies?

IAN HUNTER: It all goes back to the observation of reality and imperfection. If you watch the battles and fight scenes in old movies like *Spartacus* a few times, you start to see the two guys in the background who are wearing watches and not really fighting very well. So, I think what the crowd simulation people need to work on is having the bored extras fighting not so well in the background!

MATTHEW GRATZNER: My favorite thing in the *Lord of the Rings* movies — and if you watch the DVD, you can see it — is a sequence toward the end of the first film, when the orcs are coming down to the river and there’s a big climactic battle. There is this great Cablecam shot flying over all the orcs running down these steps — and there’s one guy who’s kind of tiptoeing! Here’s this orc brought up from the depths of evil, and he’s afraid he’s going to fall down the stairs! And it’s great. It’s great that they didn’t go back and fix that digitally. It was great that they had some guys in costume, and that it wasn’t all CG. You get that kind of thing with real people. You get guys in 100 pounds of costume and makeup and uncomfortable shoes, making sure they don’t trip down the stairs.

CINEFEX: Are these huge CG crowds just the flavor of the month? Are we going to see less of them in the future, or more?

JOHN KNOLL: There are fads in the visual effects industry, and crowds are the new fad. But like any other fad, the novelty will wear off and it won’t be used just for its own sake, to show off the technology. The dog will wag the tail again.

ROB LEGATO: When zoom lenses came out, everybody used zoom lenses — and the first time you saw a zoom, it was pretty novel, and that was great. But then, everybody was zooming too much, and it drew too much attention to itself, and you just didn’t want to see it anymore. As soon as any new thing comes out, everybody overuses it.

PHIL TIPPETT: Remember flying logos in the ‘70s? Wow, computer graphics flying logos. Remember morphing? Yeah, morphing, that’s cool. More morphing, more morphing. Now it’s



10,000 charging guys — and, to me, they all look like the same 10,000 guys! Did they go to central casting and get the same 10,000? It's a technology that is out of the can, and it works because it plugs in. But to me it's like, 'Yeah, yeah, I've seen that a million times before...'

NICK DUDMAN: I liken it to makeup effects, when suddenly someone discovered that you could put balloons underneath prosthetic pieces to make the skin bubble. Dick Smith does *Altered States*; and for the next five years, every movie with makeup effects — and I was as guilty as anyone — had people's skin bubbling and bulging. Even if it wasn't particularly necessary — 'Hey, look how clever we can be!'

ROB LEGATO: Eventually, people with taste decide to use that new thing in a tasteful way, buried within a shot, without calling attention to it — and it works really well because they put it in its proper place. It's not the be-all, end-all.

CINEFEX: What do you see as the next step in crowd replication technology?

MARK STETSON: Massive is the ideal, and I think the next step will be a more simple implementation of it. Right now, the extensive motion capture work you have to do to create your agents for Massive — that's a big endeavor, and it takes a substantial movie project, like *Lord of the Rings*, to justify it. So simplification of the process will be the next great step, I think — being able to carry over motion capture created specifically for one film to the next. Massive is playing with that, packaging stock agents with the software. Not a bad idea.

CINEFEX: The point about the impact on an audience of real crowds and real stunt people versus CG crowds and digital doubles could be made when it comes to digital sets. That huge vista from *Lawrence of Arabia* — you could probably replicate that digitally. But would it have less of an impact on the viewer, knowing it was a synthetic image, rather than something David Lean shot out in the desert for two years?

MATTHEW BUTLER: I think so. I think people feel gypped. They would prefer to look at an original painting than a replica — even if the replica is a better painting.

JOHN VAN VLIET: *Lawrence of Arabia* never fails to astound me. I look at it and think, 'God, that was hard to do!' But the bulk of the theater-going audience doesn't really care. Most of them are like: 'Yeah, so what? It's a guy in the desert wearing sheets!' They haven't made one of those movies in a very long time; and we're not going to see them anymore. And, as a purist, as someone who thinks those kinds of movies are really cool, I'm going to miss that. But I also think looking at pyramids is really cool — and you'll notice that nobody is building pyramids anymore, either.

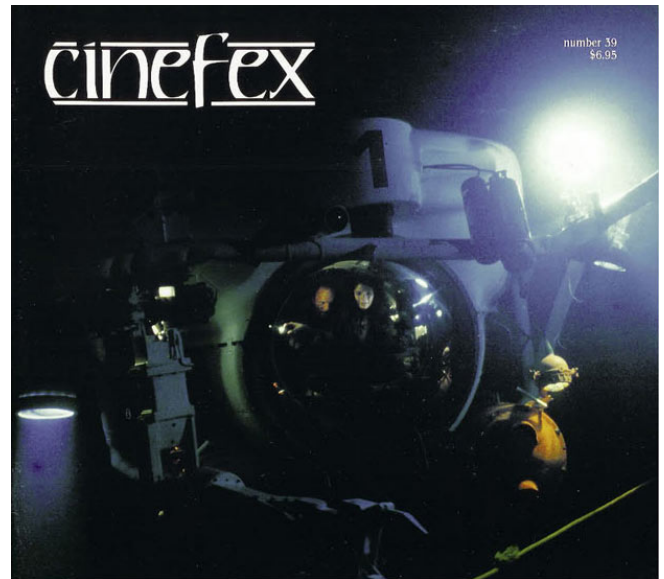
CINEFEX: Given the economics, you're right — no one will ever make a movie the way David Lean shot that one. And digital sets and landscapes will be the cost-effective way of setting movies in exotic locations. But will those digital sets and locations ever really look as real as those that are photographed?

COLIN GREEN: In my opinion, 100 percent computer generated, fantastical landscapes don't have the same sort of vibrancy and true sense of space you get when you actually build the set or go to the real location.

PHIL TIPPETT: The only completely convincing, realistic virtual world I've seen, where I was just completely sucked into it, was Master and Commander. The work in that was just unbelievable. And part of that was — I remember reading that Peter Weir got on a big boat and sailed around Cape Horn. There was a palpability and an understanding of the real experience that was pulled across all of those shots — and there were a shitload of greenscreen shots in that movie. But they were really good, partly because they came from an understanding of the real experience.

PATRICK TATOPOULOS: The dangerous thing about creating environments in CG is that because you can do anything, you can lose track of that sense of reality. For example: in architecture, buildings have to be built according to the realities of engineering and structure. You can design a building in CG that ignores all those structural elements — but people won't buy it. So I think that when you do CG environments, you still have to figure out the mechanical aspects of things. Don't think of it as a CG building or environment. Think about — 'If we had to build this thing in the real world, how would we do that?' It has to be grounded in reality.

ROB LEGATO: I have a theory about this. Say you're looking out this window, to a scene outside. That building, which was built in 1910, is right next to a building that was built in the 1960s. There's a palm tree over there that has been there a long time. Everything out there has a story to it. When people create a synthetic background, there is no backstory. They don't put in the 1910 building, because they don't think of it. They don't put in the 1960s building, because it looks kind of funky. The palm tree, you might put it there, but it would be art-directed to be in just the right place, not in the place it just happened to be in the real world. Whereas, New York has a certain style to it — good and bad — and there are buildings and



things next to other things that I wouldn't put there if I was art directing it. But if I photograph New York, I have no choice. Those things are all there — and that choice that I couldn't control is what gives it life. A synthetic environment has no history to it. It's just a generic, soulless facsimile to fool your eye into thinking it could be a cityscape. But it's not a real cityscape, not a real landscape molded by windstorms and rain, and at some level you know it, no matter how well it is done. I don't like it, and I don't hate it — it just leaves me cold.

KEN RALSTON: But synthetic sets have always existed — look at a matte painting from a movie in 1930. Okay, that's not a 'digital backlot,' but it's an 'analog backlot.' It's the same trick. There are times when you have to create whole worlds — like in *Contact*. That digital environment was an island of fantasy proportions. I have nothing against that. I think it's very exciting if it's used in the right way.

MARK STETSON: Look at a film like *Spider-Man* — the cityscape work on that was fantastic! I remember thinking to myself, 'If Luc Besson could see this, he would want to make a *Fifth Element 2* — and I want to be there when he does.'

CRAIG BARRON: I think virtual worlds are very credible at this point — they just have to be used more effectively. Too often, they are just sort of there, sitting flatly as an image. They have to become more a compelling part of the filmmaking process if we're going to get shots like Lawrence attacking Aqaba.

CINEFEX: Anything new in virtual set technology?

JOEL HYNEK: Something that I think is the beginning of the future — at Digital Domain, we've come up with a program called Terragen, which can generate terrain procedurally. It's based on digital elevation maps, and there are rules for where on the terrain the trees will be, what surfaces get snow, what don't — all of that. And you really can't tell the difference between that CG terrain and photographed terrain. It's really been an eye-opener for me; and I think, in the future, plate photography will just be sort of a design guide for the Terragen guys.

CINEFEX: Do you still have to use photographic textures for trees and rocks and that sort of thing — or is all of that created, as well?

JOEL HYNEK: It's all procedural, all synthetic. So there are CG trees, CG rocks. There's a program for putting roads in — you just loosely indicate where you'd like a road, and the program will bend the roads where they fit best, shave away a bit on the steep part of the mountain, just like a contractor would. The program does all of that.

CINEFEX: Sky Captain and the World of Tomorrow and much of the recent Star Wars movies were shot on bluescreen stages, with synthetic environments added in postproduction. What do you think of that approach?

STÉPHANE CERETTI: I think sometimes it makes directors a bit lost. It's not like Cleopatra, where they built all of these big sets, and everything was just there. Now, directors have to think forward to what is going to be there, and it is sometimes difficult for them to imagine all of that.

RICK BAKER: Actors, too. I don't know that it's necessarily a good thing to have actors acting on a bluescreen set. Actors are funny that way — they kind of need visual stuff to play off of.

PHIL TIPPETT: Working on an all-bluescreen set would have to beat an actor down. I can't imagine he would be able to draw the enthusiasm that he does from walking onto a cool set or being out in the middle of an amazing landscape.

JOHN KNOLL: I've heard different theories on that. Some stage actors say that it's not that different than acting on a stage, because you frequently have to ignore distractions on stage and play to things that aren't really there. But I have heard that complaint from actors, and I understand it. The essence of acting is reacting, and if there's nobody or nothing there, it is hard.

Rob Coleman: I'm sure it makes actors long to go off and do a costume drama.

RICHARD EDLUND: You'd have to be nuts to be able to act a whole movie in a green room! Are you going to get good drama with actors working within that kind of environment? When you look at actors who have been shot against green and they are walking along, talking to some monster, they look lost.



CRAIG BARRON: I've noticed that — the actors' eyes look glazed over on some of the big effects shows, like they don't know where to look, or what's really going on.

PADDY EASON: The actor gives off all kinds of little physical cues to the fact that he is standing in front of a bluescreen. His body language is different in a constrained studio space than it would be on a real location. The direction of his gaze, how expansive his gestures are — all of those things are subliminal cues that can make the audience pick up on the fact that he was shot on a bluescreen stage.

CINEFEX: Some actors seem to be better at it than others. We've heard that Will Smith and Tommy Lee Jones were great at it in the Men in Black movies; same with Jude Law in Sky Captain.

ROB LEGATO: Leonardo DiCaprio did some very nice things on bluescreen for The Aviator. He did his job as an actor, which was to create reality out of unreality. Actors do that all the time. They do intimate love scenes talking to a dot on a C-stand. We're asking them to do the same thing in a bluescreen environment. The breed of actor coming up will be more comfortable with it because it will be commonplace, just part of the fabric of making movies.

BROOKE BRETON: This is where previz can come in again — it can literally put the actors into an environment and show them exactly where they are in space, so that they understand what they are moving through. It can make it more of a virtual reality experience, putting them in that place and giving them a context to work in.

CINEFEX: You're talking about the Encodacam thing, being able to see a prevized environment in playback, with all of the camera moves and everything?

BROOKE BRETON: Or maybe it would be a virtual reality headset that they could wear, walk around the previz 'set,' then take it off and say, 'Okay, I got it.'

CINEFEX: As films are shot with fewer set pieces, and more extensive bluescreen, what technical difficulties do you face?

PADDY EASON: Lighting is often the thing that stymies perfect insertion of real characters into virtual environments. It is really hard for a director of photography to light bluescreen material, particularly if he doesn't really know what the environment is going to be. There have been a few rays of hope in terms of techniques like those being done by Paul Debevec, who has suggested using virtual environments to drive exotic lighting rigs — to use CG environments to light live-action.

CINEFEX: Has this Debevec technique been applied to realistically light a bluescreen environment?

PADDY EASON: I don't know if it's been used for anything other than technical demos. In the demos, there is a hemispherical lighting grid, and it looks great. But getting that scaled up big enough to incorporate people moving around, I don't know. It would mean that filmmakers would have to be quite disciplined in terms of defining their environment before they shot the characters; but I can see that happening.

JOHN KNOLL: As of right now, though, it is still really difficult to do good lighting on your subject in a completely blue environment. I may get the lighting on the character the way I want it, but by the time I've done that, the bluescreen is virtually useless because it's no longer extractable. So, on the Star Wars movies, I always argue for having some set there — 'Can I have a floor? A little piece of wall?' When you have a set, you can do all kinds of nice things with lighting that are much harder to do when you have a completely blue environment.

CINEFEX: What counter-arguments do you get when you ask for a piece of set and they say 'no'?

JOHN KNOLL: That it's not worth it. It's three shots, and they're not going to build a set for three shots. And I understand that. But when there are enough shots — when we can do 20 out of the 28 shots in this sequence entirely against the set if we build this bit of wall and this table — then I think it's worth it to build that set. It gives us an anchor down the line, a little piece of something to establish the look.

KEVIN MACK: On *The Grinch*, we decided early on that we would build just so much, and then tent the whole damn stage in bluescreen. But it was still a huge set, so it gave the actors enough real stuff to interact with and feel as if they were in a real place. This idealized strategy of, 'Oh, we don't need to build any sets, we're just going to have everything be bluescreen' winds up costing so much money, because they're modeling telephones and trying to track them into people's hands. It's insane. They'll build only half a desk for an office scene. They'll do a CG cubicle and have to put CG maps on the walls. It's like, come on! Print a map, hang it on a wall!

CINEFEX: Is digital technology going to get to a point where you won't need bluescreen or greenscreen to extract an image?

JOHN KNOLL: Roto is already much better — both because of experienced people and computer assist. We did very little bluescreen on *Pirates of the Caribbean*. We made a conscious choice to roto — and it made all kinds of things better, in my opinion. We didn't have any of the lighting constraints you get with bluescreen, so it could be lit like any other shot in the movie. We had total freedom of where the characters moved and what direction that camera was pointed. It is a viable alternative to bluescreen.



CINEFEX: Let's talk about a sub-category of virtual settings — what is, probably inappropriately, called 'digital matte painting.'

CRAIG BARRON: We should have called it 'environment creation,' or something like that, because they're not really matte paintings anymore. But they're called that because we don't have a better way to address it.

CINEFEX: To the matte painters who made the transition from brush and canvas to computer-created environments — what have been the advantages of the new approach?

SYD DUTTON: It allows us to realize dreams. I used to dream about flying through cities, for example — and now we can actually do that. We never could have done that before.

KEVIN MACK: The computer just removed an unnecessary barrier between the vision and the execution. I'm a painter, and I still paint, but I like painting on the computer better. On the computer, I'm actually painting an image, instead of smearing colored goo on a surface. That's not to diminish how magical it is to smear colored goo on a surface and make a wonderful piece of art. But that is pure craft. I'm more interested in the concept, in the end result, than the craft it takes to get there. Working with a computer has its own craft, of course, but it is a little more direct.

HARRISON ELLENSHAW: What I love about it is that you don't have to agonize over the 'make it look real' part. If you want to paint grass, you run outside with your digital camera and photograph some grass and bring it back in and import it. And the matching — it used to be a pain in the butt to match grass to grass and sky to sky. You'd paint it blue, do the wedge, send it to the lab, it would come back — 'Well, I almost got it.' Add a bit more blue, send it in again...it would never match! But in the computer — ahhh. You go 'ping,' and it matches!

CINEFEX: Is there anything that actually worked better the old way?

HARRISON ELLENSHAW: What I find most difficult is that, before, you had a geographic sense of the entire matte painting as you worked. As you worked on one part of the image, because of your peripheral vision, you would see the rest of the painting. And that sense of where everything was helped you to place the elements in a successful composition. You don't have that same sense when you have to scroll across your painting on a screen. Even if you reduce it down to see the whole thing, as soon as you zoom in, you lose it again. That's the biggest disadvantage to digital. And it's a significant one.

CINEFEX: How do you get around that?

HARRISON ELLENSHAW: The best way to get around it is to block the thing out on something that is three or four feet wide, just to get a sense of it. Do all the things that you used to do in the days before digital. And then you scan that sucker, get the sky to match, put it all together, and bingo, you're done.

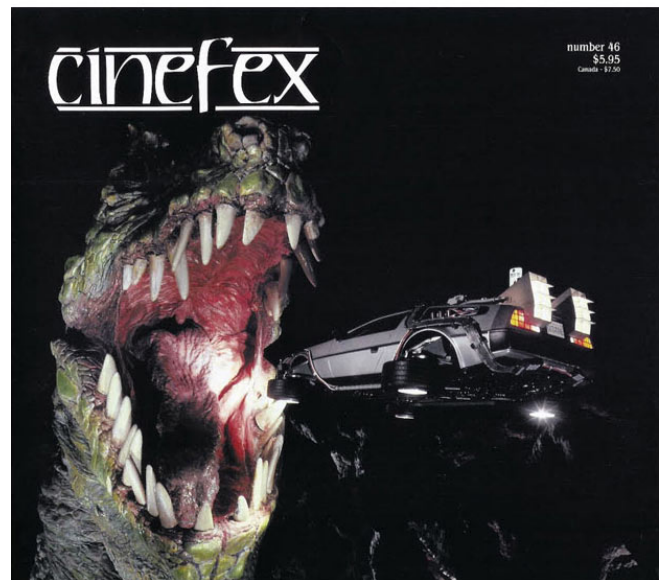
CINEFEX: What role do you see matte painting playing as we progress into the future?

SYD DUTTON: I think it will play a tremendous role. We're going into a phase where there will be a real blur between what is 3D and what is a matte painting — that's the future I see.

CINEFEX: Are digital environments just another fad, or are they going to become the norm?

MATTHEW BUTLER: I think we'll see more digital environments, because there is a perception that they save money. But I'd like to see those real numbers. On the production side, they say, 'Everything we don't have to do, we save.' But what they don't do on the production side has to be done on the digital effects side — and that's not free! It saves headaches on the set with the actors, and that's a positive thing — but how much do you pay for that at the back end? Not just financially, but in terms of what it looks like? Is it really better? Many times, we just wind up replicating reality anyway. If you can shoot reality, why are we spending all this time and effort replicating it in CG? I don't get it. The very best you're going to get is what you could have shot in camera.

NED GORMAN: Whether or not we see more digital sets will depend, I think, on what happens with Sky Captain. If that does well, it's going to herald a new thing. People will realize that the digital backlot isn't so much having a bunch of digital sets that you can pull out and use over and over — which is what the term often refers to — it will be building a movie around bluescreen performances. Physical production will wind up being a bluescreen cove on Stage 10 for three months. If you can get Jude Law and Gwyneth Paltrow to do that, and you can get Tom Hanks to do Polar Express, then the studios are going to start thinking it's a good idea. Even if Sky Captain doesn't go over big, it will be one of those fulcrum films that pushes a new concept. Tron was one of those. It wasn't as big a hit as they were looking for, but everybody in the industry knew it was an important film. Same thing with Final Fantasy. It wasn't as successful as they'd hoped, but everybody in the industry looked at it, and thought, 'Hmmm...'



PHIL TIPPETT: Look at what happened when sound came in. They had been making some great silent films, but then sound comes along and a bunch of crappy sound films come out until it gets to a point where it's a bona fide craft. Same thing with color. I think Star Wars and Sky Captain are harking back to those types of historical turning points. We've got a new kind of tool, and everybody is learning to use it. So the pictures right now might not be the best, but they are pioneers for a kind of cinema that is sure to come.

CINEFEX: What do we stand to lose — if anything — as films become more dependent on synthetic camera moves, characters and settings?

ROBERT SKOTAK: Overall, I think that synthetic images are promoting a sense of illustration in visual effects. You come upon the castle in the mist, and it is the ideal time of day, it is backlit, the mist is just so... It's that massaging thing again. It feels too much like an animated film, because it is all pretty, all controlled. It's a style that's already becoming tired.

Steve Begg: I think we lose the spontaneity and immediacy of conventional filmmaking techniques if we become too dependent on synthetic images. And, you know, when you enter a completely controlled environment, the weaknesses of the filmmaker really become more evident — because the director has godlike control over the images, and the movie is still a piece of crap! You are far less forgiving in a synthetic situation than you would be if the director gave it his best shot in a real-world environment and just didn't quite get there.

CINEFEX: Are we sacrificing the audience's emotional involvement in movies by making them increasingly artificial?

MATTHEW BUTLER: We are, but I don't know if that's the fault of the content's being artificial, or the fault of how it's done. We've all been moved by a Disney cartoon, and that is clearly synthetic.

TIM McHUGH: Look at the Pixar movies. They're fantastic. Each time I go to see the next picture, I say: 'Well, it won't be as good as the last one.' But then, it is! I'm always amazed by their ability. It's the storytelling that gets you.

JEFF OKUN: You could have made those Pixar movies in any medium, and they still would have worked, because the story was there. The fact that they were made in the digital medium is coincidental, almost. There is a section of Hollywood that is waking up to the fact — because they've had so many flops — that when a movie has a good story, it seems to make money, regardless of the effects.

CINEFEX: The effects don't even have to be that good, if the story is there.

BILL TAYLOR: That has always been the case. One of the best movies ever made, North by Northwest, has some matte paintings in it that are real pokes in the eye, frankly. But it doesn't matter, because the audience is always with the movie.

TIM McHUGH: In the original Star Wars, there are some matte lines, and some of the contrast is off, and there are a few comps that I'm sure were raced out of the lab at the last minute, dripping wet — and I don't care in the least. I loved the movie the first 20 times I saw it; and it still holds up today.

MATTHEW BUTLER: It is amazing what we as humans will forgive if the underlying story carries through. Look back at early television shows — no one cared that they were crap. We will overlook so much if the plot and the story are good. We just need more directors who really know how to maximize and handle synthetic content.

CINEFEX: Do you think computer generated synthetic content is seen as having less craft behind it than the synthetic material generated by classic Disney animation or old-style matte paintings?

STEVE JOHNSON: I think the more people understand that what they're seeing is something that was designed on a keyboard, the less involved they are in it. Because, after a point, it all becomes math. It takes the magic away from the process. The magic of special effects is — how did they do it? But when the answer is always, 'They did it digitally,' it becomes pretty washed out and gray. You're not being tricked. You're just watching something with zeroes and ones.

TIM McHUGH: Twenty years ago, we actually rubbed elbows with grips and gaffers. We went out on sets and looked through the camera and got up on a crane that was dangerously close to the power lines. I'm still coughing up the smoke from Blade Runner. The process of producing effects shots has become much more polite, now. But are we missing something because of that? When people ask if they can visit my shop, I say: 'Yeah, but you'll be really bored. We look like a typing pool.' It's a dozen people sitting around computers, staring at screens. Do movies play differently because of that?

CINEFEX: It goes back to that idea we were talking about with digital doubles and stunt sequences — it may be that the audience enjoys something more when they know the physical effort that went into it.

Rob Coleman: It's interesting... Some of the kids on my animation team had never seen any of Ray Harryhausen's stuff. So we screened it for them, and they were saying: 'Ah, man, that doesn't look all that great! You guys go on and on about this stuff?' And I'm like: 'Hey, listen!



This was incredible! This stuff took our breath away! One guy, no assistants! Why don't you try animating something straight ahead, all day, without looking at it, and we'll all review it tomorrow in dailies. Then talk to me!'

ROBERT SKOTAK: When I saw *Nightmare Before Christmas*, I had to catch my breath, realizing how difficult it was to do. I was speechless. How the hell did they do this? I was awestruck by the work and dedication that went into it. So, yeah, if the Sistine Chapel had been painted with spray paint and a big stencil, but it still produced the same image, would it lose something? I think so. I think being aware of the sheer artistry of people like Ray Harryhausen — one guy sculpting, animating and setting up shots — that's extremely impressive. When you have hundreds of people and a \$25 or \$30 million budget, it's much harder to see the artistry in it.

RANDY COOK: You can look at Ray's stuff, and say, 'It doesn't look real' — but isn't it still a greater achievement? You have to contextualize the time in which an achievement was made. Since it is much easier to do blurred animation now, for instance, anybody can do blurred animation. Since it's much easier to set a couple of keyframes, more people can call themselves animators. I have great admiration for today's animators; but they don't necessarily have the discipline Ray had when he was sculpting his own monsters, creating his own puppets, snipping the foam off seams, doing all the lighting himself, all the design himself. So I think it's illegitimate even to make the comparison, because he wasn't doing the same thing we do today. He was doing something much more difficult.

VAN LING: I get the feeling that a lot of younger practitioners look at Harryhausen's or Willis O'Brien's work and say: 'Oh, that was kind of quaint. That's what my Dad and Granddad thought looked real — hah, hah.' But I look at it — my God, they were doing things that were phenomenal, things that you can do with a push of a button today. I think that some of today's artists, if you threw them on an island with the old equipment, and said, 'Make a movie,' they would not survive.

CINEFEX: Harryhausen and O'Brien are probably the epitome of hand-crafted filmmaking — one guy's vision carried all the way through to the end. We're now at the other end of that spectrum, with many artists working on different aspects of a single shot. How do you maintain a sense of artistic ownership in that kind of assembly-line atmosphere?

STÉPHANE CERETTI: Well, at Buf, we're not organized like an American company. We do not split the work. Usually, our guys do their shots all the way through. They start with tracking and matte extraction, they work on 3D, compositing, rendering, lighting — very often it is the same guy doing everything. So each shot becomes his shot, and he really has a connection to it. He wants to make it right. And he is proud of it.

PHIL TIPPETT: In our company, too, we have struggled to give the craftsmen and the artists some level of ownership over their work. So we try to organize things along those lines. We try and build everything on sequence, so that everybody has more of an understanding of how a shot works into a scene, and how that scene works into the larger fabric of the picture — so they can understand their relationship to the whole as opposed to that tiny mosaic part. That is a problem with computer graphics. The technology is so counter-intuitive and so complex and so constantly changing, it's a fight. It's a war against the machine to maintain that sense of old-world craftsmanship.

VAN LING: I know freelance artists who've had offers to work at the larger facilities, and they've refused primarily because they want to be able to have that pride of ownership. That's getting tough, because the effects done today are more assembly-line. Due to the volume, it is more efficient to split up the work, have each person do his or her job, then slip it under the door into the next room. It's like putting in lug nuts at the auto assembly plant. And that's sad. Because one of the magical aspects of visual effects has been that sense of hand-crafting. It's not just assembling widgets.

CINEFEX: Let's focus on 3D animation for a bit.

It's probably the sexiest aspect of digital technology, in most people's minds. To start off — what digital characters do you feel typify the state of the art of computer animation?

RICK BAKER: I was blown away by Gollum. I couldn't sleep after I saw that movie because I was so excited by that character. Yes, there had been some good CG character stuff before that. The stuff in Jurassic Park was great. But those were still dinosaurs stomping around. Gollum was a real character. That's what excited me.

JOHN VAN VLIET: Gollum was terrific. His motion matched his mass. He moved as he should move. He had a personality that was telegraphed by his motions.

RICHARD EDLUND: To me, Gollum was the most exciting visual effect to happen in the last decade — a totally believable CG character.

ALEC GILLIS: Gollum was absolutely beautiful. One of the things that impressed me was that when he moved his eyes around, you could see the rippled texture of his eyeball — which you don't usually see in computer animation. They had that down beautifully.



STEVE JOHNSON: Gollum was amazing...

STAN WINSTON: Gollum was a beautifully done thing...

PHIL TIPPETT: The psychological aspects of Gollum were really compelling and fun...

DENNIS MUREN: Gollum was a character you could engage with...

CINEFEX: Gollum is cited by nearly everyone as the best CG character to date. To those of you who worked on Lord of the Rings — to what do you attribute Gollum's success?

RANDY COOK: I attribute a lot of it to the fact that he was the best written CG character. He was written as a star turn, a scene-stealer. There was also a lot of collaboration between Peter Jackson, Fran Walsh, me, the animators and Andy Serkis to make sure that performance was just right — take after take after take to ensure nothing was too big or too small. And there was also all the sculpture and texturing and subsurface scattering and hair work and compositing. There was a lot of stuff, other than the animation, that went into the success of that character. But without his being written as an interesting character in the first place, Gollum wouldn't have been that successful. It was really the first great part to come along for a CG character.

RICHARD TAYLOR: What I appreciate is that Gollum only exists today because of the efforts made with Jar Jar Binks and other CG creatures that have gone before him. It is so easy for people to be critical of a CG character — but how incredibly ambitious and groundbreaking have been the efforts by artists around the world to bring these new and unique creatures to the screen. Our work has built on the backs of that earlier work.

JOHN VAN VLIET: As a character, Jar Jar Binks should be killed on sight — but, man, he played. The fact that people hated him so much, that he evoked that kind of a reaction — well, that's a pretty amazing reaction to get to a digital character.

Rob Coleman: That's exactly what George said to me. And I was like, 'Oh, okay...but can we please not have him in the next movie?' (laughs)

CINEFEX: What are your thoughts on the state of computer animation today, both in terms of the art and the technology?

Rob Coleman: I'm excited about it. For a long time, we had technicians in 3D animation. There was a period where all we talked about were technical issues. 'How come the enveloping is breaking on the shoulder? Why can't we get the such and such to render?' That kind of thing never comes up in our conversations anymore. Now we have actors in 3D animation again. It is all about performance. I don't have to think about the machine at all. I can just focus my animators on acting, performance, movement, weight, storytelling, editing — all the things that were expected of traditional animators at Disney in the glory days.

JOHN VAN VLIET: I think the 'Golden Age' of computer animation is just about to start, because these guys are really maturing. I've seen some really, really good stuff.

CINEFEX: Digital monsters and creatures have some of the same pitfalls and/or advantages we talked about in regard to digital doubles. Unlike puppets of the past, they can do anything, leap any building. That would seem to make for far better movie creatures — but has it?

BEN SNOW: Yes, but it can lead to problems, as well. The Mr. Hyde character in *Van Helsing* was conceived as this giant, for example; and because he was CG, the idea was to have him do stuff that a guy shot on a bluescreen stage could never do. But if a 10-foot-tall character is suddenly agile and doing impossible stuff that a real person couldn't, then he loses believability. Because it is CG, you start justifying these outrageous moves and action — and you make it more artificial. That's the danger of it. And, with Mr. Hyde, all of that outrageous movement meant that we never got as good a look at him as I would have liked.

ROBERT SKOTAK: CG creatures can jump at camera from here to there in a zip — and, in theory, that seems like it should be frightening; and when we first saw it, it was. But when you see the Morlocks in *The Time Machine*.— and I'm not taking anything away from the people who do this stuff — but the idea of these Morlocks in broad daylight jumping up at the camera and leaping, to me, that is not disturbing. It would have been more frightening if they had moved in the shadows, so you didn't quite know what they were. It's a matter of taste and restraint. Hold back. Play your moment when the moment is right. The effect shouldn't be throwing something in your face as a tour de force, as technical prowess. It should just be the right technique to get across a very disturbingly unique idea.

CINEFEX: There seems to be a push to proceduralize character animation. Is that a good idea, or not?

PADDY EASON: I'm very keen on it. But the tools don't seem to have moved on much in the last few years — and so people are still keyframing things they shouldn't be. You've got creatures and characters that need to have weight and inertia; and a lot of the time, you look at animated creatures and you just know they're keyframed, because the physical reality of momentum and weight and so on just isn't there.



MATTHEW BUTLER: Some people say, 'Keyframes are for wimps.' Others say that if it is not hand-animated, it's crap. But neither of those statements is quite right. When you have a non-fantastic shot, something that has behavior and physical dynamics that the audience is well-educated about, then you've got to keep it dynamically real, you've got to do it procedurally. If you've got a guy falling off the back of the sinking Titanic, his center of gravity had better look right and he'd better be falling at a rate governed by the laws of physics, or else you've failed. For something like that, I don't want to hear, 'That should be keyframed,' just for puritanical reasons, or because it is 'art.' Bullshit. I respect the hell out of great character animators like Andy Jones. I'm in awe of what those people can do. But where it is more appropriate to use automated procedures, we should do that. Conversely, if you're animating a fantastical thing, go for it. You don't have to be constrained by those same concerns. The bottom line is to make it look great, whether it's done procedurally or by keyframe.

ANDY JONES: I don't see procedural animation as being really strong for hero type work. The reason you animate that stuff is the same reason you have a particular actor play a particular role. You want that 'special performance.' Procedural, to me, means that anybody could come in and do it. But it's a great shortcut for things like jiggle and flexing of muscles, for wobbling extra loose skin or fat. And if it is driven off of the character, it's that much more believable.

JOEL HYNEK: I see no reason why even hero stuff couldn't be done procedurally, at some point. You'd capture all these personality 'rules,' which then could be applied to the CG actor or creature. I'm not talking about performance capture. I'm thinking more of a procedural route, where you would create a whole set of rules. Just like in Terragen you have a set of rules for how terrain looks and where vegetation grows and whatnot, you would have a set of rules for a particular actor, developed after watching him for a while and figuring out what he does — situations where he tweaks his ear, et cetera. You could just study somebody and write a whole set of rules about this person's personality, and wind up with an 'actor in a box,' so to speak. Someone will do that someday.

BRIAN VAN'T HUL: I think the next step in A.I. will be to say, 'Okay, I've got my digital character here, and I've typed in the line of the script that he needs to say.' And I'll hit a button and he'll say the line, but — 'Ah, no, it needs to be a bit more angry.' So I'll just push this little anger slider from .3 to .32. Push the button, say the line — 'Yes, that's better.' It will be just like programming particle systems.

CINEFEX: We've heard actors referred to as cattle, but never particles... We'd like to explore that A.I. idea; but first, let's talk about motion capture. There are differing views on the use of motion capture in 3D animation. What are your thoughts on that?

PHIL TIPPETT: I don't particularly care one way or the other. I think any way you get a performance is viable. If you were doing a Big Foot movie, there's a justification for using motion capture. If you were making a giant squid movie, however, I would advise against it. It's a matter of having the tool fit what you're doing.

ANDY JONES: I think mocap is extremely useful. I wouldn't do a show without it, if my character was humanoid. There is so much subtlety to motion capture, so much detail that propagates through the spine and all these areas when you walk. If you and I were motion-captured walking across a stage, and we put that capture data into Sonny, for example — the robot in *I, Robot* — you'd easily be able to tell, hey, that's you walking, that's me walking. The subtle differences between our two walks would come out in motion capture.

CINEFEX: For all its potential, however, motion capture has a reputation for being a bit of a headache.

ANDY JONES: Yeah, and so to make it less of a headache than it usually is, I like to have the mocap plug right into whatever puppet or rig the animators are accustomed to using. If there are certain controls that are used to flex the spine, for example, the mocap will bake onto those same controls. Traditional mocap is just forward kinematics, and it is very difficult to edit or change. It is better if you have a good TD who can write a tool that just reverse-engineers it back into the animation control, so that animators can easily see what their normal controls are doing with the new motion capture, and be able to edit it and change it.



CINEFEX: That was the big problem with motion capture, initially. Changing anything in it was a bear.

ANDY JONES: There are tools that work around that now. In today's age of plug-ins, it's pretty easy to create user-friendly motion capture. But there are a lot of facilities that still hate using mocap, and it surprises me.

JOHN KNOLL: I really haven't understood the disdainful attitude some animators have about motion capture; but I think that's changing. The last couple of shows that made really good use of it — Hulk and Pirates — did a lot to convince curmudgeonly animators that it was a tool that could help them. It allowed them to focus on facial expressions and acting performance because they were starting from a baseline of authenticity that is really hard to get any other way. In the end, the shot looks more convincing, and the animators look good.

Rob Coleman: Some animators do look at motion capture as if 'the devil has arrived.' I don't feel that way at all. But I do have opinions about how the best motion capture is produced. One of them has to do with how the markers are applied to the suits. On most motion capture suits, the markers sit on the fabric, which actually moves around as the performer moves. They're supposed to be capturing the skeletal movement of the human body — but they're not. What they are really capturing is the outer skin movement, or even more precisely, the outer fabric movement of a costume. And that changes the movement somewhat. When I look at video reference of a performer doing something alongside the motion-captured 3D reference of the same thing, there is an extra bounciness or softness to the movement in the motion capture that isn't evident in the video reference. Mocap still gets us a long way down the road, though. If an animator had to animate all of that, he'd spend months doing what we can turn around in a day and a half. So it's incredibly valuable. It just shouldn't be taken as gospel.

CINEFEX: It would seem another problem is that you are sampling something at what equates to 60 frames per second, and filtering it down to play at 24 or 48 frames a second.

RANDY COOK: And, consequently, a certain amount of data is lost. For Gollum, we often had to take our motion capture and adjust it to make it seem to have weight. Part of that had to do with the fact that Andy Serkis, who is a muscular, stocky guy, was being triggered to Gollum, who was an emaciated guy. When Andy compressed himself into a little ball, for instance, Gollum would be compressed much less tightly when that was translated to him.

JOHN VAN VLIET: I thought one of the things that was wrong with Hulk was that they did what appeared to be motion capture, but it wasn't scaled to match the size and weight of the character. So you had this huge guy who weighed 600, 800 pounds, but he moved like a 180-pound guy.

CINEFEX: How do you go about altering motion capture data to make it fit characters of different shapes and sizes?

JOHN VAN VLIET: You just have to expand and contract the motion capture to fit the physics of the character — and that's about acting. Any good animator is a master of that. If you look at the animation from the Disney Golden Era, those animators were able to successfully convey weight and performance to characters depending on what they looked like. A great example is Stromboli in *Pinocchio*. He's this big, heavy-set guy, and he's got this huge belly bouncing around. If they had animated him like a skinny guy, it would have looked ridiculous.

RANDY COOK: Overall, I'd say motion capture is a good tool for duplicating something, but not such a good tool for the stylized duplication of something. I just think that a good animator can get more versatile results than you can get in a motion capture situation, especially if you are trying to do something other than a human.

CINEFEX: For Gollum, Andy Serkis was captured, in some instances, on the set; but it was a big deal to set up. Is on-set mocap becoming a more streamlined process?

ALEX FUNKE: That's another technical zone that is just on the cusp. Mocap has tended to be a very mechanically limited process. Once we get past that problem and get portable equipment that can be installed more or less transparently to the rest of the production, I think it is going to be used more and more.

CINEFEX: Let's talk about performance capture, which records the entire performance of an actor, rather than just generic movement. How important is performance capture going to be to 3D animation in the future?

JOHN GAETA: The acquisition of real performance unlocks everything. To me, it is the centerpiece of all these topics, the eye of the storm. A lot of people now want to replace this arcane, primitive, marker-based methodology with an image-based system that captures everything in one go. On the *Matrix* movies, our term was 'universal capture' because it had shape and texture in the same go; and it was a face model textured with the real-time textures that came with the performance. The reason why it was trained on the face was because that was the limit of high-definition — and we wanted high-definition so that we could go straight digital in data. As we move to ultra-high resolution, ultra-high frame rates, ultra-high sampling,



you'll be able to capture full scenes. And, as algorithms are devised to calculate more, you'll be able to use fewer cameras. So instead of having a bank of high-definition cameras, you'll have stereo ultra-high-definition cameras at high sample rates doing the work for you. And maybe those cameras, which look like big clunky trucks right now, will become really small, so they can fit into hostile film environments. I think that's going to be the direction.

CINEFEX: So you could take a full performance on a modestly scaled set, drop it into any environment you wanted to, and put any kind of camera move you wanted on it?

JOHN GAETA: Well, lighting is still an issue. The trickiness is that if you want your characters to be able to move through environments, the lighting is going to change. So you still need to overcome a homogenized lighting at capture, and be able to take the derivative lighting from environments and apply them successfully without having confusion in the rendering. Lighting has to be a major breakthrough that goes hand in hand with universal capture.

CINEFEX: For *The Polar Express*, this technology has been used to capture Tom Hanks' performance, and then translate it to a number of different animated characters. Those characters are somewhat stylized, however. Might it one day be used to animate a more reality-based human character?

RICHARD EDLUND: My feeling is that the way we're going to create a likeness of a human doing a dramatic role will be to use artificial intelligence technology. The whole essence of humanity is personality, and keyframing is not going to get us there. Animation is too intellectual. There's no serendipity in animation. But there is serendipity in actors interacting with each other. Your hand happens to catch on your pants and that slows down the conversation a touch. Maybe a word will catch in the mind of the other person, and the whole thing takes off in another direction. That kind of magic and performance will only be creatable through artificial intelligence techniques.

CINEFEX: Do we have the computer power necessary to make that kind of leap in A.I. for these purposes?

RICHARD EDLUND: Well, in that regard, Moore's Law is very much our friend.

CINEFEX: What is Moore's Law?

RICHARD EDLUND: Moore's Law states that memory will be half as expensive and twice as big every two years. And that has proven to be true, since the age of vacuum tubes. Think about it. Eight years ago, when I was writing checks at Boss, we were paying \$25,000 for nine gigabytes. And now it's a dollar a gig at Fry's! If Moore's Law holds true, it means that by 2009 or 2010, your laptop will have the same memory as a human being; and by 2020, your laptop will have the memory of all human beings — you'll have the Library of Congress, the paintings of the Louvre, your favorite movies, all on your laptop. That's going to make possible some amazing technology — technology that's currently being developed for medical research, defense purposes — and the movie industry will piggyback on that.

CINEFEX: Can you give us an example of that technology?

RICHARD EDLUND: Well, about five or six years ago, a group of doctors developed a form of heart surgery where they basically punched two holes in the chest, one for a camera and the other for a scalpel. And technology was developed to take the beating of the heart out on the monitor the surgeon was looking at, so that he would essentially have a still heart on which to work. The heart doesn't just beat — it changes shape when it beats, which makes it harder to make cuts on these little capillaries. So this technology 'unanimated' the beating heart.

CINEFEX: It essentially ironed out all the motions?

RICHARD EDLUND: Right. And in coming up with the technology to do that, they came to understand how the face works. They could put little sensors on the surface of the face, and they were able to see how the musculature of the face moved underneath. And it was so sophisticated, it could conceivably be used to animate even the most stoic of performances — say, Anthony Hopkins in *Remains of the Day*. Just think how difficult that would be to animate. So all of this is happening, and the sky's the limit.

CINEFEX: So the sensors on the face — you're talking about really advanced facial capture.

RICHARD EDLUND: Yes. They tested it for *The Incredible Mr. Limpet*, because they wanted to put Jim Carrey's face on an animated fish. They cyberscanned Jim Carrey's face; and then, from



his face structure, they created the musculature going on underneath his face. Then they photographed him with a 4x5 view camera, and mapped this high-resolution, photographic surface onto the cyberscanned geometry — which was perfectly accurate. Then they put dots at certain points on his face — about 20 of them — and he would do his facial schtick. And they used that data to re-animate the digitized face, which could now swim into different lighting situations and whatever. So it wasn't just a matter of facial placement; they had ultimate manipulability in terms of being able to light him. I saw it, and it had his personality — but the tests looked so revolting and strange, it really wasn't something that you'd want to have in your memory bank.

ANDY JONES: We tried facial capture on Final Fantasy and Animatrix. We tried putting 60 reflective dots on the face; but no matter how many markers you put on the face, you're still filtering the movement of the skin — and it looks like that. The only true way to do facial capture is with an optical system, like Optiflow, tracking every single pixel. The systems right now are a bit crude; but in the next couple of years, I think it will be there.

CINEFEX: Hoyt, you did some experiments at Disney with an optical tracking system, didn't you?

HOYT YEATMAN: Yeah. There's a project that's been in development for years, called Gemini Man. It's about an aging U.S. government hitman — who would be played by someone like Clint Eastwood or Sean Connery — who becomes the target of assassins, one of them a 28-year-old clone of himself. The idea was to see the old Sean Connery up against the young Sean Connery. The filmmakers explored makeup approaches, but those didn't work very well. Then they took a 2D approach, having a Flame artist do paint work, and the results looked like a bad burn victim. So they came to Disney and asked what we would do. One option was to replace the actor's real head with a digital 28-year-old head. But they wanted that head to be driven by the actor's performance, not animated by animators. They didn't want any tweaking at all. That meant some kind of performance capture system. And it had to work in the field — in sunlight, in the rain, in the dark.

CINEFEX: That's a tall order.

HOYT YEATMAN: We scoured technical stuff from the medical field, from the military, and we found all kinds of capture techniques — but all of them were either structured light or some kind of Vicon system with dots on the face. They were all just capturing the outer shell of the face, and none of them would work in movie production. So we came up with our own idea. We started working with visual flow optical analysis on image-based systems, in a hyper-stereo rig. Big fancy word — but, essentially, it means photography of the guy's face. And every single pixel of that face is a legal target for tracking. So we don't have hundreds of points to track — we have thousands! Instead of tracking reflecting dots or lights, this image-based system analyzes the flow of pixel migrations using two cameras. The other part of the equation is that, as opposed to just the movement of the outer shell, we actually understood what was going on with the muscles inside the head. We built a muscle system with a finite number of controls. The theory was that if we could replicate the human face accurately, combinations of these finite number of controls would allow us to hit any expression.

CINEFEX: So you built a very accurate CG head that had all the underlying muscle systems?

HOYT YEATMAN: Yes, working with plastic surgeons. And the muscles were connected to slider controls. So, say you have a 100-frame shot. This machine would go through all 100 frames and do an analysis of the optical flow as the pixels were migrating around, and then it would go through all the permutations of all those controls until it found the appropriate ones. It built characters. And, the best part was, I could cross-map that performance onto any muscle system — imagine a Cheshire Cat with a performance driven by Robin Williams! We were also able to record all the lighting in the set — there were no CG lights. It was a very intelligent system. We did a test, I presented it to everybody at Disney — Michael Eisner was there, Roy Disney was there.

CINEFEX: And...?

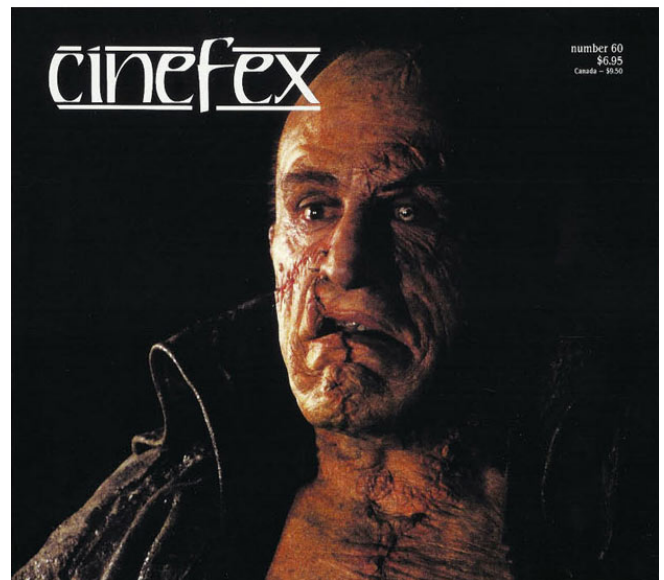
HOYT YEATMAN: Disney said that if they decided to go ahead with Gemini Man, they were going to ILM! They had the technology right there, in their hands, and they just couldn't see it. And, as far as I know, to date, all they have done is go to ILM and ask, 'Can you do a test for us?' It's like the Chinese reinventing gunpowder...

CINEFEX: All of these technologies, no doubt, are being pursued aggressively in the gaming industry.

HENRY LABOUNTA: Sure. In gaming, the holy grail is to bring believable characters to life. In our sports games, we want to make the players do things they would really do — like in a real soccer game, for example. Thinking, interacting. And that takes the game-playing into a whole other level. When you can look at that character and — Why did he do that? What is he thinking? Oh, my God, he saw something! Or he is distracted by something, and that's why somebody was able to sneak up on him. Subtleties like that that make you feel as if you are playing with real people. And that is really crossing a barrier.

CINEFEX: Will A.I. or performance capture technologies ever get so advanced that animators will be out of the picture?

ANDY JONES: Animators should be scared of that no more than actors should be scared of digital replacements. The technology is never going to fully replace us. There's always going to



be a need to animate, to adjust things. Even if the mocap looks great, you're still going to need somebody to maneuver and tweak it.

KAREN GOULEKAS: I've heard so many people say, 'We're just going to do motion capture and a little cleanup and we're done.' 'No! Believe me, we need animators.' Motion capture doesn't alleviate the need for them. Every shot's still got to be touched. Sections have to be blended, timings have to be changed, you've got to be able to override it, add stuff, subtract stuff. I think it will always need some of that animator love.

Rob Coleman: That's like the question that has been coming up for ten years — is 3D animation going to get to a point where we don't need actors? No, no and NO! Even with CG characters, you will have actors like Andy Serkis in front of the camera, and people like me and my team behind the scenes. You have on-set actors for the live actors to relate to, you have voice talent. It isn't HAL 9000 sitting in the back churning out all this footage! There are people attached to this stuff; and in one form or another, they are actors. Actors have not been taken out of the equation at all.

KEVIN HAUG: Character animators are actors. Sooner or later, people are going to admit that, and they'll start getting their own Oscar nominations.

CINEFEX: Almost did with Gollum.

KEVIN HAUG: But the studio only pushed the actor. Why not push the actor and the animator? Because there were definitely two guys behind that performance. If they had both been standing there, saying 'We are Gollum,' that would have been much more interesting.

CINEFEX: Discussion of performance capture leads us to a question that always seems to elicit sighs... How close are we to developing a photoreal animated human being?

KEVIN MACK: The technology is there to do it. The math has been done. But it has yet to be implemented to the degree that I think is necessary to create a photoreal human being over the course of a movie, with closeups and dialogue and whatnot. But it's within the scope of a single project now. So, whoever comes along and says, 'Yeah, we need this,' if you get the right people together, it's going to be done.

Steve Begg: I think we're on the cusp of achieving it — but there's an exponential curve. The last ten percent is the toughest part of trying to achieve a photorealistic human. Human beings are very aware of subtle details in the face — and if those details are not present, or not carefully placed, people can detect artificiality.

Rob Coleman: We look at human beings our entire lives, and so the human brain and eye are extremely sensitive to both facial and body performances. You can go to a baseball game, and there are a thousand people in the parking lot coming toward you, and you are looking for your friend — ah, there she is. She is in the distance, no more than seven pixels high in our world; but your eye can instantly find her. If we are that sophisticated at discerning details of hair color and body language and skin tone at that distance, think how sophisticated we are when we are looking at someone up close.

KAREN GOULEKAS: The idiosyncrasies of a human face — it's incredible! When we were investigating techniques for *The Incredible Mr. Limpet*, I took video of Jim Carrey from the front and the side, and had an animator mimic what he was doing with his face, frame by frame. And it was amazing how much was going on in his face, even in his quieter moments. It was so subtle.

When his eyelids came down, for example, one eyelid started a few frames earlier than the other. One cheek would puff very slightly. The final animation looked very real — but it took such a long time to do it. You could never afford to hire animators to sit and do that for an entire performance in a film.

CINEFEX: We've been talking about animation issues, but what about rendering? Are we even at a point where we can make a still CG human look photoreal?

VOLKER ENGEL: We're close. I was just recently looking at a book that contains only digital art. It shows these human figures — only as still frames, of course — but there are a couple of them where you can't see any difference between them and photographs of real people.

JOHN DYKSTRA: One of the biggest problems is the business of subsurface scattering and specularities and all of the things that make up flesh. It's very tough to do. It varies based on whether the person is flushed or not flushed. How close the bone is to the surface. You can do a computer program that will figure all of that out. You can ray-trace it, and, by God, you can



make an exact duplicate of human flesh. The problem is that nobody can afford to do that many calculations. It would take forever to tweak. It's just impractical.

BEN SNOW: I think using real photographic texture reference is going to be key. Some of the image-based techniques that were used on Spider-Man 2 and have been demonstrated at Siggraph give you some really nice results in terms of the look of the skin. Taking a lot of photographs of real flesh and real actors and even using some of this multi-image-point high dynamic range photography of actors in different lighting — essentially, it is real photography. It's mapped onto CG geometry, but you are using actual photography; and that will make the skin look real.

CINEFEX: Final Fantasy probably came the closest to achieving a photoreal human, so far, in terms of the look. But people didn't buy it.

ANDY JONES: It was painful to get as close as we did, and still come up fairly short. I know how many people put so much energy, so many late nights into that project. And for people to look at it and be like — 'Eh, it looks fake...'

CINEFEX: How successful did you think you were at the time you were doing the work, before any critical response came in?

ANDY JONES: We always thought it looked kind of strange. My biggest fear on that show was that if the characters looked perfectly real on still frames, we'd be in even more trouble — because the more real it looked, the more perfect the animation had to be. Because if it isn't perfect, it looks a bit like you're puppeteering dead people. They look like zombies, because they don't have that spark of life, that soul. If you don't feel real life there — especially in something that looks so real — you are going to be weirded out by it. So, I was kind of happy we didn't get the look any closer than we did — because, if we had, the animation would have been that much more grotesque. It was a constant worry.

Rob Coleman: I think if they had stepped even farther back, and said, 'Okay, we're going to do stylized human beings,' they would have been far more successful. I loved the stills — that woman with her glistening hair looked great. But as soon as she started talking, it was creepy.

DENNIS MUREN: It's been charted — as something gets closer to reality, it's more enjoyable; and then it drops off immediately, just before it hits absolute reality. We've always known that. As soon as the stuff becomes really close to reality, it starts to look bad — deformities, all sorts of god-awful stuff you wouldn't even want to think about. You work your tail off to create this thing, and the closer you get to it, you're still not there.

BEN SNOW: It's a robotics theory called the 'Valley of the Uncanny,' and what it refers to is that the closer a robot gets to having human features, the scarier it is. And we've seen that with computer graphics. The closer we get, the harder it is to accept them. The beautiful work done by Pixar or PDI in those animated films — the creatures and the toys are all fantastic. But then you look at the humans — 'Ooh, that's creepy.'

GRAY MARSHALL: When I first saw *Final Fantasy*, I thought, 'Well, nice try guys. The hair looks great — but I don't buy it.' But then I saw the next generation of what that team pulled off in *Animatrix: The Final Flight of the Osiris*, and I realized that they hit the same problem that all movies hit when they have several years of production — at a certain point, they had to lock their code, otherwise you would see improvements throughout the movie, and it would be inconsistent. So they locked their code in early, and yet the code continued to develop; and it wasn't until their next project that they were able to bring that more developed code into play. And while I don't think that *Final Flight of the Osiris* was 100 percent either, I could see how far they had advanced. It made me realize that any concept I had of 'It will never get there,' was ridiculous. It will get there.

CINEFEX: If you could overcome all of the inherent problems — the freakishness of it, the technical issues — what would you use this CG human for, other than a very specific application for a very specific project, like *Gemini Man*?

DENNIS MUREN: Why even use it for that? I think it would be a totally false accomplishment. Why not just get an actor, Rick Baker, and a good acting coach to focus on how the younger Clint Eastwood moved? An actor with makeup doesn't have the sex appeal or the godlike thing that a computer has, I guess. You know, Robert Redford's son lives near here, and he looks a lot like his dad. But I don't see people running out and putting that team together to make this movie. How come? Because it doesn't have that godlike appeal. So, yeah, we could do it if we had enough time and money, but why?

JOEL HYNEK: One reason I could see for it — I could see studios and insurance companies requiring a basic capture of an actor; so if the actor died during filming, they could finish the movie without him.

Steve Begg: I think the photoreal CG human has fantastic possibilities for horror effects. We could achieve things that prosthetics would never be able to achieve.

KEVIN MACK: You could have a character with two heads, for example; or one side of his face is one guy, and the other side is another guy.

CINEFEX: So you're talking about applications of it as a 'digital makeup.'



KEVIN MACK: Yes, I think people are ready to see something better and more realistic than the type of application makeup we now see for aging, for example. It could be used to age an actor, or — again — to depict him at a younger age.

RANDY COOK: It could be a great substitute for doing a youth makeup — because you can only pull that skin so tight! It would allow you to make that aged actor's eyes sparkly again, his skin tight, his facial features like they were before the inevitable coarsening of age. The Pixels of Dorian Gray...

PADDY EASON: We've thought about this in terms of the Harry Potter films. We can't make those films at a rate of one per year — which is how the books are paced — so, by the time we get to Potter 7, how old are these kids going to be? Will it be feasible by then to actually have the actors still doing those roles, through the use of virtual makeup? Or will we be able to replace them entirely with versions of themselves that are a few years younger? It's intriguing.

CINEFEX: To the makeup effects practitioners — what do you think of the possibility of doing virtual makeups?

RICK BAKER: I think it's a pretty stupid idea, unless it's to do something you can't do with makeup. You can't really flatten a nose with makeup, for example; and I think it's exciting that there is a way to do that now. But there is a magic that happens when you get a good actor in a really good makeup. Working on *The Nutty Professor*, Eddie Murphy became a different person when he was in the Sherman makeup. There's just something that happens, and it is really magic.

ALEC GILLIS: We've seen actors, as we put the makeup on them and transform their faces, they hit a point where they just light up — and all of a sudden, they're into it. It changes their performance, gives them new information to create the character. Would they be able to do that in the same way if they just had sensors on them as tracking markers for digital makeup? I don't think so. I can see it helping to shorten makeup application times, though. The prospect of being able to go in digitally and smooth an edge that is showing, and being able to take an hour off the time in the makeup chair because of that — so much the better for the actor and for us.

CINEFEX: One application for the digital human that's been talked about is bringing back deceased actors.

KEVIN MACK: That's a fascination for a lot of people — but it's a novelty thing. And I think the vast majority of people would see that as being in poor taste.

RANDY COOK: I'm not interested in bringing dead actors back to life. Say they're going to have a new movie with Marilyn Monroe. Well, first of all, does anybody in today's moviegoing demographic remember Marilyn Monroe, or give a damn? And how can you re-create Marilyn Monroe without re-creating all of the psychological elements that went into her? There may be a way of taking the sum total of an actor's performances and painstakingly feeding them into a computer, and analyzing them for mood and movement and whatever. But it would be an awful lot of work for a very small result. What's the point? Do you really want to do I Married Joan: The Motion Picture with a digital Joan Davis?

Rob Coleman: Somebody has said that they're going to create a synthetic John Wayne — well, good luck!

PADDY EASON: Oh, it's ghoulish, isn't it? Let's have something original!

NED GORMAN: I was kind of the go-to guy for this when we were working on some special projects in the early '90s. And I can't tell you how many calls I fielded — 'Okay, we've got a deal with Chuck Norris to fight a digital Bruce Lee — are we there yet? Can we do a photoreal Bruce Lee?' 'Uh...no.' I got the Marilyn Monroe call. I got the Elvis call at least once a week. As a film lover, I've always had an objection to it. If we are so hard-up for something fresh that we have to re-create the legends — come on, guys...

CINEFEX: Do you think current, living actors will ever license their digital doppelgängers to perform for them?

Steve Begg: I believe that's already happening! In *Minority Report*, didn't they cyberscan Tom Cruise's head and license it? I don't know what it was for, but I remember reading about it.

CINEFEX: Possibly for the *Minority Report* videogame?

HENRY LABOUNTA: It happens all the time in gaming, especially for sports characters. We're using photographs to portray their likenesses and, as much as possible, we're bringing their particular behaviors into the performance — like signature swings, so when players are up to bat, they don't all have the same swing. We want to portray not only their likenesses, but also their behaviors. In gaming, celebrities — especially athletes — have been licensing a kind of digital double for quite a while.



CINEFEX: So, when it comes to a CG human character, the consensus seems to be that we will be able to do it, and that there may be some applications for it — but those applications aren't necessarily practical or desirable. Other than the 'godlike' appeal that Dennis mentioned, is there a good reason the industry should chase this?

Rob Coleman: I think it is the wrong thing to be pursuing. Theoretically, we can understand what it is to replicate a human — the details, the micro-movements, things we can't even articulate. But to actually achieve them on screen, in a sustained performance? I don't think so. I can put human qualities into a character; I can make something human-like. But to make a living, breathing human being — I think that's a waste of effort.

STAN WINSTON: Even if it can be done, you wind up with a bunch of characters that are just human replicas — and that's boring. If I'm going to animate a character, let me create a character that I couldn't do with a human being. If you can do it with a human being, do it with a human being!

CINEFEX: Is there value in doing it just for what would be learned in the process?

KEN RALSTON: Possibly. One of the hardest things to do as an oil painter is to paint the human body. But when you finally achieve that, you can probably paint a lot of different things, because you've overcome all kinds of hurdles, technically and artistically. So when you do achieve this amazingly lifelike CG person, you will have learned a lot.

VOLKER ENGEL: From the audience point of view, I don't want to see virtual actors. I want to know it's real people. I don't want to know it's just a bunch of numbers up there. Even from a studio's point of view — I want to know that I have actors who will later do the PR tour!

RICHARD TAYLOR: Ultimately, the reason you go to the cinema, pay your money and sit in that dark room, is to form a relationship with the characters on the screen. At the most base level, we want to watch other human beings just like ourselves perform these amazing stories, and we want to form these relationships with them. We will always want to see real people performing in the movies.

PHIL TIPPETT: I think it would be terrific to do a full theatrical feature film with art-directed human characters, though. Would they be photographically real? Uh-uh. You wouldn't dare go near that. You would try and make an interesting, believable character that is true to itself in the story. And someone is going to do that, at some point in time.

CINEFEX: If nothing else, we'll see more sophisticated digital doubles — characters that are so real-looking, the camera will be able to get much closer to them than it does now.

PHIL TIPPETT: That's how it will come about. We'll just get closer and closer to CG stunt doubles. It's like when Dennis showed me the T-rex for Jurassic Park. At first, they rendered it at a hundred yards; then, 'Hey, let's push the camera in closer — whoa, it really holds up!' The problem is going to be running into the production wall. Because, for this kind of character to work, it's got to work in every single shot. It's not like a dinosaur that can be creaky in one shot, but it doesn't matter because you still get the overall gestalt. A human character has to be a character, and if it breaks, it breaks — that puts a huge onus on the creative and technical staffs.

CINEFEX: This is a bit off topic, but it's an interesting question: As digital manipulation becomes more sophisticated, how might it be misused? Are there nefarious applications of this technology?

JOHN GAETA: I like to joke about the 'Orwellian traps of virtual technologies,' but it's no joke. The military and intelligence communities are pouring a lot of research dollars into image-based computer graphics, using them to craft domestic terrorism scenarios and simulations. It's all in the interests of national security; and, at the moment, it's innocent. But, you know, technology is not exclusive to the United States. Technology escapes quickly. Anything we can do here is doable in Pakistan in a few years. So there is a scenario for abuse. Historical revisionism. Falsified news events.

CINEFEX: Like Saddam's Information Minister saying that their side was winning the war — if he'd had imagery to back that up, it might have been more compelling!

JOHN GAETA: Oh, yeah. The motivation to abuse it is pervasive.

VAN LING: The technology can definitely be used for evil, as well as for good. Technology is now being used to tweak live broadcast shows, for example. There was a lot of talk about Whitney Houston looking anorexic, and her collar bones being too prominent in her live show; and so they went in and painted them out before it went to broadcast. People are experimenting with postproduction product placement, as well. It's a way to get around a director who doesn't want to look like a sellout by having product placement all over his movie. So they wait until the director has finished shooting — this is more true in television than it is in films, at this point — and they put logos on what were originally generic shopping bags. That kind of thing.



CINEFEX: Let's move from the digital world on to the 'real' one. Live creature effects — puppets, makeups and animatronics — used to be the only game in town. Now those techniques are in competition with 3D animation for character work, a subject we'll get to. But first, in what ways has digital technology benefited live creature effects?

NICK DUDMAN: In some respects, it has helped us a great deal. The ability to do rig and rod removal has made our lives a lot easier. It has allowed us to think outside the creature, as opposed to having to create something that is totally self-contained.

ALEC GILLIS: To some extent, it has also opened up opportunities for us. People often ask us, 'This computer thing — does it cut into your work?' But it has actually expanded the work. There is more work now, because more fantastic movies are being made. But they still can't do all of the work in the computer, because it is far too costly — and that means more work for us.

RICK BAKER: I play with computer stuff all the time, just for myself. I think it's exciting, and I embrace it — but I don't think it's the answer for everything.

CINEFEX: In some people's minds, it is the answer for everything, particularly when it comes to creatures.

RICK BAKER: Yeah, and I hate to see the rubber monster business disappearing. There are limitations to what we can do with rubber; but there are limitations, also, with the computer stuff. I'm hoping it will level out a little bit so that there will be a nice marriage of the two.

CINEFEX: Given all the fantastic new materials and mechanisms, what are the limitations of 'rubber' on the set? What problems remain with animatronics or puppets or man-in-a-suit?

ALEC GILLIS: What we lack is the ability to animate our characters in the same way that digital companies animate their characters. A digital company can, on a frame-by-frame basis, tweak and refine. We have that ability — the technology exists — but we don't have the support of the studio or the mindset of producers to say: 'We're going to approach the animatronic effects like we would animation. We're going to be very specific up front about what we need, and we're going to give these guys the time they need to hone this to an exact performance.'

STEVE JOHNSON: With a digital performance, you can keep perfecting it until you go to answer print. But when you're doing it for real, on set, you only have the time between the director saying 'action' and 'cut' to get your performance on film.

ALEC GILLIS: And, unlike with computer animation, a director or producer can walk on set, and our butts are hanging out. If there's an awkward movement of the creature, if there's a suit performer who is drinking Gatorade through a straw that goes into his neck, they see that, and it chips away at the illusion.

CINEFEX: Whereas a digital effects company hides all of its developmental stuff.

ALEC GILLIS: Appropriately so. You don't have a director there 24 hours a day looking at an animation pass that sucks — you are just showing him what you want him to see. But we are married to the live-action world, like actors. If Jennifer Garner doesn't look so good in the morning, everybody knows it. It's the same with animatronics.

CINEFEX: Animatronics do have a reputation for being difficult to deal with on a set. After he did E.T., Spielberg said that he'd never shoot another movie where one of his lead characters had a bunch of cables hanging out of its ass.

PATRICK TATOPOULOS: There's no doubt about it — practical creatures on set are a pain in the ass. And I say this, having a company that does these things! They are not easy to deal with. You have to light them properly. You have to have five people in the background to operate them. You have a limited number of things you can do with them. You have to go into it knowing what you're getting into.

CINEFEX: But that E.T. puppet gave a beautiful performance; and the later CG version didn't seem to have the same charm. There are cases where puppets and animatronics work beautifully.

KEN RALSTON: Yes, and in most of those cases, you've had someone like Steven Spielberg directing, who knows how to shoot it if it isn't doing exactly what he wants. It's unbelievable what he gets out of this stuff! The shark in Jaws? That thing blew up constantly. Even Stan Winston's great stuff in Jurassic — the T-rex? What an unwieldy monster! But Steven knew what he could get out of it, and when to pull back, clear the set and do the rest with CG. There are only six minutes of CG in Jurassic Park; the rest is all Stan's stuff, cut beautifully by Steven.

CINEFEX: Is the methodology that Spielberg set up for Jurassic Park — using animatronics for some shots, and computer animation for others — still workable?

PHIL TIPPETT: I'd probably do the same thing, even today. I don't know if he would — but from what I saw, being able to make the live-action props that the actors could actually work with brought them that much closer to the thing. Could Steven have gotten the performances



out of those kids, with the tyrannosaurus head banging into that jeep, without that animatronic there? I don't think so.

NICK DUDMAN: Animatronics can still serve a very important function on the set. Stan's T-rex, sitting on that aircraft simulator, chucking itself about on the set? There is no question that the fear generated out of an object like that will tell in the performances of the actors.

RICHARD TAYLOR: Another great example of that approach working is on *The Lion, the Witch and the Wardrobe*. For that movie, Andrew Adamson — who comes from a digital background — has chosen to turn towards animatronics as the solution to some of the filmmaking issues. Another excellent example is Guillermo del Toro's *Hellboy*. What a beautiful blend of real animatronic suit work and digital technology! They came together to make that film feel gritty and visceral and more real. Another example — Nick Dudman and his work on *Harry Potter*. It can be a wonderful combination.

STAN WINSTON: Live-action films with human actors just work better when there is a blend of live-action and digital. There is something missing when a live-action movie has all-animated effects. You lose something in the actor's performance, in the feeling from the audience. Going strictly with digital to answer all your technical problems is lazy. It takes a creative mind to mix it up and make it magic.

CINEFEX: The other benefit of having an animatronic or puppet on set is that it gave the director a sense of security.

RICHARD EDLUND: It was more than security — it was like having an actor on the set. It just made sense to shoot with physical things that you could see and stage.

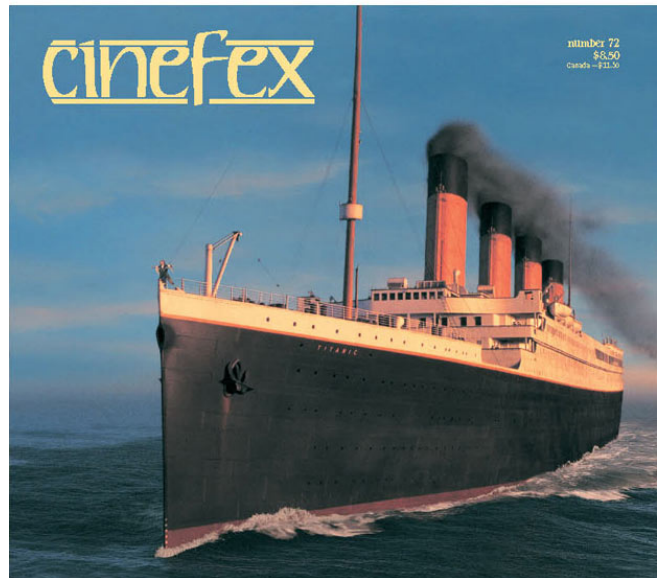
Rob Coleman: I think the triceratops lying on its side in *Jurassic Park* was the best argument for having an animatronic on set. It was an isolated scene, with a believable looking creature that human beings touched and interacted with closely. That was valid. But, generally, I don't like mixing animatronics and CG, just because of the continuity problems. I'm a fan of staying with one discipline or the other. It used to be necessary to have an animatronic for closeups, because CG couldn't sustain a closeup. But that isn't a valid argument anymore.

Steve Begg: The problem with an animatronic is that it has no 'soul.' As soulless as computer graphics can be, if you have a good animator controlling things, CG can give you a performance that no animatronic or robotic device could ever give you. Some sort of basic form is useful on the set for eyelines and character interaction; but I think those should be painted out and replaced by a CG version.

RANDY COOK: I've certainly had better luck with computer work than I've had with full-size puppetry. It was much easier and more versatile to make a Mumakil with a detailed foot and leg in the computer, since we were making him anyway, than it would have been to go out on set with giant, expensive hydraulics with limited motions. I never felt the lack of a live-action prop. Now, that is my preference because computer animation is my area of expertise. Whereas Stan has had tremendous success with full-size puppetry, because that is his area of expertise. He's a piano player; I'm a trombone player. There's no one right answer.



PATRICK TATOPOULOS: That's right. It's not a matter of a right way or wrong way — it's just a choice of which way to go. And, sometimes, the choice isn't even made based on what makes the most sense. Sometimes, the choice is made based on the way a particular director likes to work. Stephen Sommers called me to say how much he liked the practical wolves in *Underworld* — but he would never go with that approach, because that isn't the way he likes to work.



CINEFEX: Rob mentioned 'continuity problems.' One of the complaints from computer animators is that when you mix CG and practical characters, they have to match their animation to the limited movements of the animatronic. Is that a valid complaint?

ALEC GILLIS: We hear those comments all the time — to the point where we just tease the digital guys about it. We'll be on the set with an animatronic that is just for waist-up shots, that doesn't even have legs, so obviously it's not going to walk or perform other movement tasks; and we'll joke with the digital people, 'You're not going to spin this afterwards to make it look like it was a failure of animatronics, are you?' We read their complaints that the animatronic couldn't move that much; but we don't go out in magazines and talk about how their CGI is over-animated! My personal problem with CGI is that it moves in ways that real creatures don't move. Every little joint and point of movement is taken advantage of; whereas Nature tends to go for economy of movement.

CINEFEX: CG people also seem to be frustrated by the disconnect between their work and the practical work. They say, 'If only we had worked together in the beginning, it would have saved

so much trouble in postproduction.’ Is the collaboration between CG and physical effects crews getting better?

RICK BAKER: There is a collaboration between visual effects and us. But, many times, there’s a feeling of ‘the rubber guys versus the pixel guys.’ Even if a movie doesn’t start out that way, it usually ends up that way — which is really too bad. You know, why can’t everyone just get along? (laughs)

ERIC BREVIG: The best situation is when the animatronic person and the visual effects person get together and decide what will be used where and how. But that rarely happens. Usually, one person is running amok, and the other person is: ‘Oh, my God, it’s covered in fur? Now we’re going to have to render a million hairs!’ A good example is the teddy bear in A.I. It wasn’t designed with any computer-graphics-friendly concerns; and our guys went crazy trying to figure out how to match the real one. If they’d been working together, they probably could have come up with something that Steven liked just as well, but was less of a nightmare for the CG people.

ALEC GILLIS: I think the interaction between ‘us’ and ‘them’ is getting better; but there is still frustration, and it’s on both sides. It comes from a lack of understanding of each other’s techniques.

CINEFEX: So how do you get around that disconnect? If a show is going to have both live and 3D creature effects, what can you do to ensure the integration of those effects?

NICK DUDMAN: The thing I have learned is that it is essential to give the effects houses three-dimensional, fully-painted, absolutely finished works of art to work from. They have to be given very accurate scanning models. A creature sculpted in clay by a professional sculptor — even if the creature is going to wind up being fully CG — is the way to start. You can’t just describe it to them; you’ve got to show it. It helps to preserve the original idea. Anything we can do to make sure that everyone is working off the same datum helps the whole process.

RICHARD TAYLOR: We go to extensive lengths to design creatures and then sculpt them as physical large-scale maquettes that the director can interact with and move around. That maquette generates, through scanning technology, the creature that is ultimately in the computer. I think that is the essence of successful creature work. In the constant debate over digital technology versus physical effects, it is all about good design.

STEVE JOHNSON: What made Dr. Octopus in Spider-Man 2 work well, I think, even when it was digital, was that it was designed in the real world; so anything that happened mechanically in the film really could have happened in real life — because it did. We designed it first, practically, and then took it apart and gave it to the digital people to scan.

PATRICK TATOPOULOS: You have to keep a physical aspect to character design! I always start with a physical model before creating a character in the computer. You have to have something to touch.

CINEFEX: Whenever we interview digital artists at their workstations, they almost always have toys or models there. Habib Zargarpour had a fishing boat made of disposable coffee cups at his station when he was working on the CG boat for *The Perfect Storm*!

PATRICK TATOPOULOS: You need that tactile thing — and then you can scan it and throw it in the computer.

CINEFEX: One of the things we've all seen is a production commissioning physical creature effects, shooting them, and then ultimately replacing them with CG. Why does that happen?

KEN RALSTON: Because so many times — sorry, you guys who do these kinds of effects — you wheel out this big mechanical effect, which cost millions, 150 people on the crew are sitting there, you set it up, which takes forever. Okay, we're finally ready to go — this worked great in the lab! — and boom! It blows up. It doesn't work. So you wheel it out, and do it all CG, anyway. A lot of movies throw this money down the tubes because they were sold a bill of goods. If the filmmaker had understood physics and what he was really going to get out of this thing, he would never have gone down that road. He would have put the money right into a digital character, because there is no limit to what it can do.

PADDY EASON: It's almost a traditional line in a visual effects budget now — 'replace the animatronic.' (laughs) But, obviously, an animatronic can work; and oftentimes when it doesn't work it's not the fault of the animatronic team — it's the fault of the director making incorrect assumptions as to what is possible to achieve with it. It's part of the thinking of the studios that's a few years behind the times. They hope that they can get away with an animatronic, and they like the idea of seeing what they're getting in their dailies. It gives them a physical thing to look at, and say, 'Yeah, that's working.' But when it doesn't work, they've shot themselves in the foot.

RICK BAKER: Many times, I've been in the situation of setting up a makeup effect to be used a certain way with a visual effect. But then it falls into the hands of the visual effects guys in postproduction, and they say: 'Well, this isn't going to work. We'll have to do it all digitally.' And



they throw out the original stuff. My feeling is that they do it to validate the cost of their equipment! They've spent \$20 million on digital effects, and they have to have so many shots to justify it. It's not the way it should be. We're all working on the same movie. We all have something to contribute.

TOM WOODRUFF: And that philosophy of 'trying it for real, then replacing it with CG?' It becomes a self-fulfilling prophecy. It's like going into a marriage with a prenuptial agreement. You're accepting failure from the very beginning; and so, the dedication to the approach is not really there. It's almost as if the studio is just trying to cover their asses: 'Look, we tried it both ways.' But, truly, they didn't try it both ways.

ALEC GILLIS: And if the mindset is, 'We're going to give the animatronics a shot, but it probably won't work, so let's allot money to CG,' then you know you're going to have representatives of the various digital houses just waiting to get that work over to their place. So you've inevitably got someone looking over your shoulder, and saying to the director: 'That didn't look so good. Do you think that looked good?' But you have to see this stuff cut into the movie to determine if it really needs a digital fix.

NICK DUDMAN: Producers and directors are just too quick to decide that something has to be CG. They don't want to deal with the discipline of shooting an animatronic well; and there have been many lost opportunities because of that.

CINEFEX: You can see why it would be appealing to a director to have only CG creatures, though. They can just go out and shoot their plate, with nothing but a tennis ball on a stick to worry about.

ALEC GILLIS: In fact, the director doesn't even have to be there to shoot that plate! He can be off working with his actors, knowing that a team of experts is going to pull his effects stuff together digitally. CG is not simple, and it has its complications — but those are down the line. With practical stuff, they have to haul us around with them on the set. There's all this effort of dealing with ten puppeteers or having someone in a makeup chair for three hours.

TOM WOODRUFF: So, will the director wait while eight puppeteers come on and they bring in the fork lift? Or will he go to his visual effects supervisor, and say: 'Okay, bring in the C-stand with the green tennis ball. Let's shoot this and get on to something else. I'll make my day, the studio will be happy, and we'll all get out of here early.' I'm disappointed when directors take that approach, as opposed to directing a creature, directing puppeteers, directing people in suits. Why shouldn't a creature be every bit as directed as every other character in this director's movie? There is a movement toward expediting the on-set process; but, that is the last opportunity for shaping those characters, other than editing. To turn your back on that opportunity is incredibly cheating of the process.

CINEFEX: It isn't only the directors who turn their backs on it. Isn't the practical approach also resisted by visual effects supervisors, especially those who have worked only in the digital realm?

ALEC GILLIS: More and more, we are finding ourselves in projects where the visual effects supervisor doesn't know that there is more than just a digital solution. Digital is their only approach, and instead of looking for the best way to make an impressive, memorable effect, they only look for the best digital solution to any given problem. We were in a meeting not too long ago, talking about building creatures that would have digital heads. When we suggested that we could do the heads for the background creatures, the supervisor said, 'That won't work, because the faces will still have to move.' We explained that we'd make the faces move through radio control, and the supervisor said, 'Oh, you can do that?' Like it was an unheard-of concept! There is a lack of experience, and therefore a lack of understanding that this facet of visual effects is still very healthy.

CINEFEX: Will it continue to be healthy, you think — or is 'rubber' going to die?

PATRICK TATOPOULOS: Well, I don't believe there is any longer a need for large-scale animatronics on a set. The day I finished *Godzilla*, I realized I would probably never do anything of that scale again. There would be no need to. There may be insert pieces — maybe a one-to-one-scale *Godzilla* tooth crushing a car, just to get that interaction. But soon, CGI will do it so well, you won't even need that. So the world of those big animatronic creatures is gone. But is it the end of all practical creature effects? Absolutely not!

STEVE JOHNSON: And you know why? Because, when it comes down to it, people are always going to want toys on set to play with. Honestly, the main advantage to practical creature stuff is that it's fun. I think everybody who gets into the film industry does it because it's fun. They have this passion growing up as kids, eating their popcorn and watching magic. They want to be in the middle of the magic when they're filming it. That's why I think this stuff will always exist.

CINEFEX: Assuming it does stay around for a while, what technological advances in live creature effects can we expect?

STAN WINSTON: There are amazing advances in hair and skin technologies, and movement. One of the things we're developing is a performance capture system — the same kind you use to



send a performance to a digital character — to optically capture the performance of a live actor and then send it right to the animatronic character. So there would be no need for a bunch of guys working joysticks.

CINEFEX: You would motion capture an actor and translate that motion to your animatronic controllers? Kind of like a super-telemetry thing?

STAN WINSTON: Exactly. The performance of the animatronic would be driven by the performance of one actor. It will be especially important for facial performance. Right now, we can do puppets that have brow and eye movement, and can even lip-sync — but it still feels like a puppet, partly because you have one performer on the lips, another one on the brows, another one on the eyes. With this performance capture system, all the subtleties that happen in a single performer's face would go to the puppet, all in sync.

CINEFEX: Any advances coming from the artificial intelligence arena?

STAN WINSTON: I've been working with a professor from MIT for three years, developing a robot, Leonardo, that can learn through its interrelationships with humans. Through that collaboration, I have access to technology that allows Leonardo to see and hear. He will look at you; and, as you move, he'll keep his eyes on you — and it's freaky. It will be years before I can actually use this and get it into small eyes — because right now, they are using very big cameras in very big eyes. But we'll get there, and it will give us more organic performances in our artificial characters.

CINEFEX: Let's move on to another area of real-world versus digital effects. A few years ago, there was a lot of doom-and-gloom talk about the future of miniatures; and yet, there seems to have been a renaissance of miniature work, with more miniature effects than ever being used in films. Do you see that happening? Is that more proof of the pendulum swinging back?

ALEX FUNKE: There is a new fascination with using miniature photography. Among other things, it can be more cost effective to do a miniature than to do, say, a matte painting. Once you build a model, you have a wide range of things you can do with it; whereas, once you've done a matte painting, that's the shot. A miniature gives you more options. It's not the way to do everything, but I think that miniature photography is going to be with us for a long time.

Steve Begg: Directors are actually starting to favor the use of miniatures — and that totally surprises me! It could only be temporary, but the pendulum seems to be swinging back toward miniatures in a big way. In a few recent productions, I've been stunned to hear people say: 'We've got to use miniatures. It's got to be tactile. It's got to be something I can walk around and touch. I know it's got to be enhanced, but give me something real.' This return to miniatures is really healthy, I think. Because if you mix and match the techniques and tricks, you continue to fool people.

GRAY MARSHALL: Miniatures are still a really good option, especially if something is going to be destroyed, blown up, or has to interact with some natural element — like water falling on it or fire wrapping around it. Anything where you are going to see dynamic interaction between the parts, I think a miniature is the way to go.

IAN HUNTER: The simple truth is that a photographed object is 100 percent a photographed object. So you're jumping out of the gate with something that's real to start with. When you're dealing with purely digital, you have to put a lot of effort into getting it to that point. And only then can you start manipulating it to make it fit into the shot. The physical model is already real! If you have a fairly large-scale model and you blow it up or rip it apart or set it on fire, all of the physics involved are built-in. We can light a model with real light, get real reflections, and when we fill it with real smoke, we get real atmospheric effects. In digital backgrounds, you have to anticipate the need to put in artificial lighting and artificial atmosphere, and all these other things that are built into a miniature.

JOHN KNOLL: You've got to force a computer graphics render, tweak every little detail to make it look realistic. But if you're out on the stage, you can put your light on your model, and there you go. The image you get back is physically correct, a realistic image. We have the physics working for us instead of against us. Real-time radiosity.

KEVIN HAUG: But a miniature is no more real than CG. It's just a cost relationship between one kind of detail and another kind of detail. If I build a miniature, I'm going to get this, this and this out of it, but I will always be strapped with the constraints of its being small. I will always have to shoot over-cranked, and the effects on it are either going to be shot as separate



elements, or they're going to have to be restricted. To get around that, people build giant miniatures. But, if you're going to do that, why not just go out and shoot real buildings and get photo textures that are spot-on and look more real than the miniature? But, that said, there is a certain amount of chaotic detail that you get out of a miniature, just because it is a physical thing on the set.

CINEFEX: That chaotic detail — can't you get that with procedural effects animation?

BEN SNOW: Simulations get you part of the way there, but they are still a lot of work. And when you look at some of the beautiful roiling you get in cloud tank material, for example — it is magical. Admittedly, someone sat at that cloud tank for days and tried all kinds of different things — saltwater solutions and whatever — to get that perfect environment. So that didn't just 'happen' either. But in the end, you get a really magical look that takes a lot of work to achieve in computer graphics.

PADDY EASON: Miniatures still work beautifully; and, arguably, a good-looking miniature is still going to look better than the best CG environment. If you cast your mind back to things like *Blade Runner*, it would be hard to equal some of those city miniatures. However, to do stuff with a 'CG miniature' or a physical miniature — that line is creeping towards CG with every year that passes.

VOLKER ENGEL: And that kind of hurts me, because I love being on the set with miniatures. When I was a visual effects supervisor, without my producer's hat on, I was very much into miniature effects; but now, looking at the economics of things, we have to make choices. On the project I'm on now, our first thought was to build certain castles as miniatures. But we found that it made more sense to travel around Europe with a 3D scanner and scan real castles, then use those for our virtual models. That was the reality we faced. But I will always work with miniatures when we are doing something with pyrotechnics, destruction, slow-motion photography — that kind of thing.

KAREN GOULEKAS: There's a place for both. It just depends. What's the smarter use for the technique, and which one gives you more flexibility? And, of course, money comes into it. And who's available. Is your favorite miniature guy available, or your favorite effects house? If one or the other is booked, you may feel differently about which way to go.

CINEFEX: Even if miniatures become less useful as photographic elements, they seem to have a role in creating digital environments. How valuable are miniatures to building synthetic worlds?

BEN SNOW: That's something we'll continue to see — building and lighting miniatures, but not spending months shooting them on a motion control stage. We might take photographs of them, then scan them and re-create them in the computer. That allows us to use the marvelous talent of the model shop, and the skills of the lighting DP, but still have the flexibility of doing camera moves in the computer.

It really does give us a boost to start with that real material.

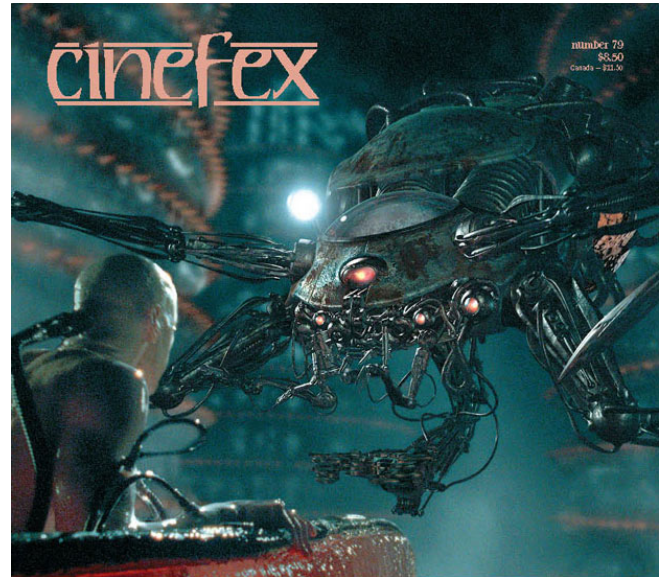
STEVE GAWLEY: Sometimes what people call 'digital set extensions' are really our models that they've shot and then digitally multiplied. Or, they'll build CG geometry and use our paint job for texture maps.

IAN HUNTER: We were looking at doing some shots for a show that was in the middle of post, and this place was showing me a great matte painting they'd done — a really spectacular palace. And I thought, 'Wow, that is really nice.' But then, during the tour of their facility, I saw that palace under some stairs — and it was a model built by Greg Jein! 'Uh, what's this?' 'Oh, yeah, we took that outside and shot it in the sunlight as digital stills. That's what we used for the matte painting.' And I'm thinking, 'Well, then, that was really a composite, wasn't it?' (laughs)

CINEFEX: Final miniatures question — in what ways has digital technology aided miniature effects?

MATTHEW GRATZNER: Our crew chiefs and draftsmen are all very savvy in CAD and Rhino and 3D Studio Max, and we build all of our models in the computer now before we construct them physically. We can build an accurate computer model in Rhino, section it up and use that as a template for sculpting the real thing. And then, during previz, we can take that same model and import it into Maya and use it as a previz model — and we know that everything will line up.

STEVE GAWLEY: For my current project — Lemony Snicket — the production designer provided us with 200 architectural drawings of a huge house they built on set. We were able to take those architectural drawings, input them into our computers, and make an exact 1/8-scale replica of that house. That is a great thing. It also allows us to get perfect symmetry, something we had to attempt only by eye, before.



CINEFEX: Let's talk about high-definition digital video. There are a few filmmakers who have started to experiment with high-def — Robert Rodriguez, George Lucas with the Star Wars movies. Michael Mann shot some of Collateral in high-def. What do you think of these early HD efforts?

KEVIN HAUG: I think that the directors and the DPs who are embracing it right now may not be doing the best work out there — but they're the ones who will be doing the best films in a few years, because they will have experience with that tool and really know how to make it work. Those scenes in Collateral were beautiful — and that was going onto a Firewire drive, for all intents and purposes! There are a couple of scenes at the end of that movie that could never have been captured on film.

CINEFEX: HD/DV cameras and projection systems have been in development for several years now. Where is that technology? How does HD/DV compare to film, currently?

ALEX FUNKE: It's not there yet. It's promising, but there are still some weak spots in terms of the equipment, the imagery, the projection. But I see no reason why it should not become the standard for production — even effects production — very soon. The audience doesn't worry about what film stock a film was shot in or what kind of cameras it was shot with. They are only responding to the visual experience. High-def is just another creative choice.

JOHN DYKSTRA: It's a matter of what we're familiar with. We're familiar with a surrogate for reality that we call film. But, you know, film doesn't look real. If I put a screen up next to a window and projected an image of what you could see outside that window, they wouldn't look the same. Not even remotely. But, despite that, we've fallen in love with film, and we revere it as our prime surrogate for reality. So now digital comes along — and it's trying to become a surrogate for reality by duplicating film! But I'm not sure that's the way to go. You have to work really hard to duplicate film in digital, and you have to make the same mistakes that film makes. The exciting part of digital capture isn't getting it to look like film — it's getting it to go beyond looking like film.

JOHN KNOLL: HD cameras are already exceeding film in a number of areas. You can turn up the gains and shoot the equivalent of 1200 ASA, which means you can shoot night for night, without additional lighting — like Michael Mann did on Collateral. If you have a good DP, you can make a film that looks every bit as good shot digitally as shot on film. And there's no end in sight to where the digital camera technology can go — whereas film is reaching theoretical limits in a lot of areas. So it's a no-brainer to me. Film and HD are on a par now; and in some ways HD is superior. It won't be long before, if you care about quality, you'll be shooting digital.

ERIK NASH: I think it's inevitable that film is going to be eliminated as the origination medium, if for no other reason than financial. The cost of film and processing, printing, scanning — it all adds up. But I think there's going to be a lot of resistance to a wholesale shift to digital origination, partly because of the lack of dynamic range.

CINEFEX: You're saying digital projection is going to be pervasive before digital shooting?

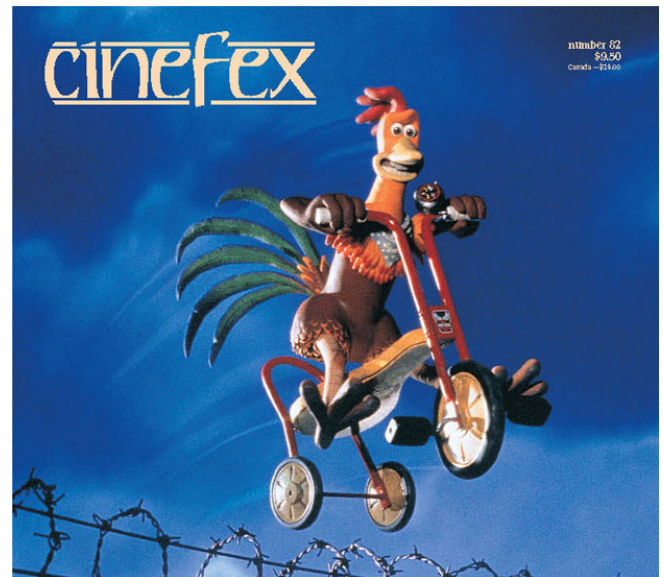
ERIK NASH: I think so, because the pros far outweigh the cons. I've seen digital projection that very closely rivals film projection. And the pluses are so much greater than the negatives in terms of durability. You watch a digital presentation, the millionth time you watch it, it looks just as good as the first time you watch it. So I think in the near term, we'll definitely see digital exhibition take over.

CINEFEX: Richard, you've been involved in efforts to explore that transition, haven't you?

RICHARD EDLUND: Yes. The Digital Cinema Initiative — a group of scientists and technology experts who have been hired by the studios to develop standards for digital cinema — has been doing test screenings at the Pacific Theater in downtown Hollywood. Together, the DCI and the ASC produced a short film that had all the extremes of photography — a wedding taking place in the afternoon, with the white lace and the black suit, smoke and backlighting, and the bald blue sky. It was shot with Super 35, anamorphic, and 70mm, then scanned at 6K, and down-rezed so it could be projected at 2K, with the answer print running on the other side of the screen. And it was about equal. Film was maybe a hair sharper. But the digital color was dead on, and it had no scratches. In that sense, it was superior. And keep in mind that we were comparing digital projection to answer print, which audiences never see. They always see a dupe.

CINEFEX: And that was at 2K?

RICHARD EDLUND: Yes. The next thing we saw was a simulated 4K projection, where they had two Texas Instruments projectors stacked on one side of the screen. So half of the screen was 4K and on the other side of the screen was film. And the 4K was incredibly sharp. Sharper than film. I was really knocked out by that. 4K has to be what is focused on in the theater. 2K is not enough.



CINEFEX: From an effects standpoint, what are some of the advantages of shooting HD/DV?

MATTHEW BUTLER: There are loads of benefits to shooting things digitally. It expedites our processes, which are done at a digital level, and it gives the director and on-set crews a quick turnaround — they can look at it and approve the lighting with the DP right there and then. So it is a great tool for a film crew, and a great tool for the visual effects crew.

Rob Coleman: HD has really impacted the level of animation in the recent Star Wars movies. In the old days, I would look at a 20-inch monitor to judge a character who was taking up maybe a quarter of the screen. 'Okay, that looks good.' And then, weeks later, I'd see it for the first time on the big screen — 'Aghh, the eyes are too wide! The pupils are dilated — I never saw that!' Now, I can have the TDs run an HD overnight and I can take a look at it right then — there's no lab run or anything. I can see it projected in the big theater, just as audiences will see it, and I can make a better judgment. There are no surprises later on.

CINEFEX: Any disadvantages?

ERIK NASH: From a visual effects standpoint, the flexibility you had in terms of being able to shoot 360 frames per second, or shoot time-lapse — things that we take for granted and are very simple with a film camera — are still big hurdles that have to be overcome with digital capture. There's a way to go there, just because the data transfer is such a gargantuan problem.

STEVE GAWLEY: On Episode II, I found that it was not as forgiving as film when it came to our aging a model. We really had to accentuate the aging. With film, you could see the subtleties because of aperture control. Whereas, video has a limited number of aperture openings. Therefore, we had to pump a lot of light into it, and it would wash out the aging. That meant we had to over-age the models — and, to the eye, they looked wrong. But on the camera they looked right. I had to retrain myself a bit.

JOHN KNOLL: Same thing with full-size sets — they need more detail. Faux finishes that you'd get away with in film look fake. Makeups have to be more detailed, because in closeups, you can see the makeup on the actors.

ALEX FUNKE: It's hard to shoot miniatures with digital. It's hard to shoot good high-speed with it — it's almost impossible to shoot good high-speed with it, in fact. Depth of field is a problem because sometimes you don't want infinite depth of field. But all of these things are being worked on, and it's just part of the development process.

CINEFEX: So, until all of those things are figured out, until theaters get on board with digital projection and so on, we won't be making the switch to high-def.

ROB LEGATO: No, but posting in high-def — that's here. On *The Aviator*, we shot on film, but did high-def dailies. We had a high-def print that Martin Scorsese could look at in his screening room with a good projector, and he could make changes right then and there. Marty would get a lot of new ideas while in the screening room. 'When we tilt up, wouldn't it be great to see the color in the guy's face drain a bit?' And I could say, 'All right — I'll do it, and call you in five minutes.' It was very liberating to be able to play around with it in a way you would never do in film. And then, the high-def print we were fixing? That is what goes out for the screening — that exact thing, not some version of it. What you see in the screening room will look just like that on film, without digital artifacts or anything.

JOHN DYKSTRA: We did a digital color time on the last *Spider-Man* — a digital intermediate. Then they put out eight original negatives. The quality of the grain structure, the color — all of that information was the same as looking at a work print. And that's something we didn't have before. The advent of digital photography means that people in the theaters are getting one less generation in the process to seeing what the filmmakers intended.

ALEX FUNKE: The digital intermediate is what cinematographers have dreamed of since somebody first turned the crank on a camera — if only I could have another crack at this! You have another chance to say, 'Okay, the sun was going down when I shot this, and I did the best I could; but now I can really make it look the way it was in my head.'

NATHAN McGUINNESS: I don't have any problem with people doing digital intermediates — as long as it really needs to be done. But I've seen people do a digital intermediate just for the sake of doing it, and what they get looks exactly like what was on the negative! So, do whatever you have to do with the movie after it has been shot on film, but leave the film alone. Film is film, and it is still beautiful. Don't try to replace it; just try to work with it.

CINEFEX: Bottom line — is film dead?



MATTHEW BUTLER: No. Film has quirks that we've learned to enjoy, for whatever reason. There are still some optical effects that have a nice, organic quality to them that I'd hate to see go away. So I'd like to see both — digital photography being a presence, but not replacing film photography.

ALEX FUNKE: There's room for all different technologies. We still have vinyl records, for God's sake! Ham radio operators still use Morse Code on occasion! The notion that film is going to completely vanish in favor of digital is a big oversimplification.

CINEFEX: One of the positive outcomes of going digital is that it could democratize the filmmaking process, enabling more people to make movies outside the studio system. Do you see that happening?

BRIAN VAN'T HUL: It was either George Lucas or Francis Ford Coppola who said that, one day, an eight-year-old girl in Iowa with a video camera would be able to make a feature-length film. That's the ultimate goal.

VOLKER ENGEL: As a kid, doing my stop-motion films, I would have loved to have a technology that allowed me to just shoot my friends in a blue background, and then do the rest of it myself in the computer...

RICK BAKER: Oh, it would be great to be a kid who's interested in filmmaking in this day and age! If you have a computer and a mini-DV camera, you can do stuff there was no way we could have done with an 8mm film camera in the old days. What you can do now on a laptop is amazing. You have all of these tools at your fingertips. I'm hoping it creates an amazing new batch of filmmakers.

HENRY LABOUNTA: The great news is that it creates an opportunity for film-making not being the exclusive domain of the big Hollywood studios. I'm as interested in hearing the stories a small group of people from the middle of the country have to tell as I am the stories Hollywood has to tell.

CRAIG BARRON: I think it will change the thinking of the studios, as well — because digital cinema will bring down the cost of making movies. And if you can get the cost of making movies down, you can experiment. Studios won't have everything riding on one or two pictures a year. They'll be able to take chances because they'll be making more movies. It's like when the studio system was in its heyday — MGM back in the 1940s released a film every week!

CINEFEX: So if a few of them were not successful, it wasn't a make-or-break deal for them.

CRAIG BARRON: Right. The studios could take chances because they had a guaranteed profit. It wasn't a huge gamble each time out of the gate, like it is now.

CINEFEX: Is that independent filmmaking movement going to carry over into effects films?

JOHN KNOLL: It already has! Inexpensive personal computers and really high-quality software have enabled a lot of people to set up garage operations. You don't have to be a big facility to do feature-quality effects work anymore. You just have to have talent.

I'm a strong advocate of this democratization of technology. There's nothing more tragic than somebody who has talent but just doesn't have the opportunity to make use of that talent because the equipment is so expensive, there is so little access. Now that there are these inexpensive tools, you can go out there and have fun with them.

CINEFEX: Presumably, digital technology will eventually put all the necessary filmmaking tools into the hands of a single individual. We could come full circle, back to the Harryhausen days of one craftsman working alone to make a movie.

RANDY COOK: The idealist in me believes it will allow one artist to sit in a room with a computer and make an animated film, and then score it himself, and cut it himself, light it, do art direction. We are in a position now, conceivably, where an artist, one guy, can do it all himself. He will have to have a multiplicity of talents, of course. But it augers well for individual artistic expression, in a form that was once unavailable to the individual. I think that may be the most exciting aspect of the computer — the opportunity it creates to put moviemaking in the hands of one person.

CINEFEX: It would seem that as digital filmmaking tools get more inexpensive and more accessible, they will also become much more intuitive.

PHIL TIPPETT: They're becoming more intuitive all the time. The last few years, my kids and I have been working on films on the iMac, using iMovie — and it's stupidly brilliant. It's like a Crayola set. It's just so completely interactive, and you can do with five commands the five things you need to do to tell a story and make it a movie and put sound on it. It doesn't have the



multitudinous layers of 800,000 different commands intimidating you to the degree that you feel like you're stepping into the cockpit of a 747 and you have to make her fly.

CINEFEX: Will the tools ever become so intuitive, artists will not have to have any technical knowledge to use them?

JEFF OKUN: Oh, yeah. There will come a time, really soon, when you will have artists being artists, instead of technical people being artists. They won't even understand the flow-chart or the Maya demo. They will just have tools that are intuitive, and they will work. It will be like getting a lump of mud and sculpting it with their hands — they will be able to do that very same thing in 3D. You'll go, 'Are you in Maya?' And they'll say: 'I don't know what the hell I'm using. I'm an artist.'

HARRISON ELLENSHAW: And won't that be a great thing?

I think for a while now the visual effects industry has been in a battle between the techies and the creatives — and the creatives are the second-class citizens. The technology gets really cool, and the technology people go: 'Uh-oh, better not tell those creative guys the secret. Better not give them the password, because they'll get the control back.' So we've been kind of at the mercy of the technology and the technologists. When you say 'Pixar,' most people out there think, 'Steve Jobs.' I think 'John Lasseter.' Give John Lasseter toothpicks and he'll make a better movie than Steve Jobs could make given all the resources of his technology. That's the battle. But as the technology becomes more and more user-friendly, the creatives gain back some of that control.

CINEFEX: For the immediate future, at least, it seems that the effects work produced by these one-man operations couldn't possibly be at the level we've seen from Hollywood and the big effects houses — no matter how user-friendly the software, and no matter how talented the artist at the console. Or, doesn't quality of effects matter?

JEFF OKUN: I think that the expectations of the current movie-going public and the generations following them are coming down. For our generation, the movie experience was Lawrence of Arabia — rich Technicolor, widescreen, lush surround sound. But I took my kids to see it and they've never been so bored in their lives. They didn't care. But then we go and see the digital version of one of the Star Wars movies, and there are artifacts and pixelation and all kinds of things that if George Lucas saw them would make him keel over dead — but the kids didn't give a darn. It didn't ruin the movie for them.

ERIC BREVIG: I see a lot of stuff now that is blurry, and nobody is troubled by it. I don't even shoot Vistavision anymore, because I don't think anybody is noticing that there's a lack of detail in some areas. You can cheat now. Skip-printing, five years ago, was really shocking. But now, people just accept it. I've seen a lot of movies lately with high-end visual effects where they've not rendered motion blur. There were falling ice shots in Day After Tomorrow where they cheated it with some 2D stuff, but it was obvious that they hadn't done real motion blur — and nobody complained. So I thought, 'Okay, I guess I'll just cheat it next time, too!' I don't know if that's good or bad; but it's definitely the direction we're heading in.

CINEFEX: Are audiences more accepting because they see this kind of stuff on television all the time?

ERIC BREVIG: I think so. It is part of their visual vocabulary. I just saw *Open Water*, which was filmed on DV, and the audience seemed very accepting of that kind of movie treatment.

JAMIE DIXON: Even if something falls short of 'photorealistic,' people are still accepting of it, as long as it propels the story. The first *Spider-Man* had a lot of shots of the guy swinging around that looked fake. You could tell they were computer generated. And almost nobody cared. It was still totally fun. It gave you that exhilarating feeling, so it served its purpose.

CINEFEX: But there's a paradox. Audiences are, on the one hand, more accepting of lower-quality effects; and yet film critics and would-be film critics on the Internet are increasingly critical of visual effects — despite the fact that effects are better than they've ever been! How do you account for that?

Rob Coleman: Part of it is that there is just so much information out there now. There's a fascination with this business — 'Look, those magicians at ILM have done it again!' When I was a kid, we didn't know how any of this stuff was done. We just let it wash over us, and we believed. But people aren't willing to suspend their disbelief anymore. Maybe it's the information age we live in. We have the Internet. We have DVDs with supplementary material — behind-the-scenes documentaries with stupid people like me in them, the director's commentary. And all those people who now know so much about the movies sit there with their friends and say: 'Ah, see that? That's not real.'

HENRY LABOUNTA: It's disappointing. A few years back, you could really impress people. Like *Twister* — 'Oh, my God, I can't believe they did those tornadoes! It's amazing!' And now it's almost become a commonplace commodity. Audiences take incredible effects for granted.

KAREN GOULEKAS: We're all more critical now, even of our own work. I recently did a voiceover commentary on a *Fifth Element* rerelease, and I had to bite my tongue not to say, 'God, that's horrible!' These were shots that I thought were good at the time; and now, I'm embarrassed. A lot of the matte paintings looked bad. The only show that holds up for me to this day is *Apollo 13*. I don't groan when I see that.



CINEFEX: One of the criticisms you hear the most is — ‘That looked too CG.’

ERIC BREVIG: When people say something looks ‘too CG,’ I think all they’re really saying is that it looks too much like bad CG. Because good CG, they don’t notice. If you do it right, audiences don’t think twice about it. Some of the shots in Spider-Man 1, people said he looked ‘too CG.’ That just meant he looked wrong. But that wasn’t because he was CG. He was rendered beautifully, there were great cast shadows and all of those things. Anything that is wrong in a shot with a CG element is blamed on the CG — but it just means there are things wrong in the shot.

CINEFEX: Does the criticism of effects come, in part, from the bar being raised so high, you can never get over it?

HARRISON ELLENSHAW: I think so. I was flipping around on TV and I saw these awful CG monkeys jumping around — and it was Dinosaur! And I remember that when I first saw Dinosaur, I was really impressed. So, now, I see these really bad CG monkeys and I realize how far we’ve come in five years. Every time I think we’ve leveled off with CG, the bar is raised higher. And I’m already at a point where I can’t always recognize the difference between CG and the real thing. Mark Stetson told me that when he saw the helicopter crash in Day After Tomorrow, he thought, ‘Wow, what a great miniature.’ But it was all CG! I can no longer go to a movie and nudge whoever I’m with and go: ‘Effects. Effects.’ They’re nudging me and asking, ‘Is that an effect?’ ‘Uh, I don’t know...’

KEVIN HAUG: Invisible effects are actually invisible now. I can’t find them. And I remember the fun in the early days was going to see an effects movie and trying to figure out how they did it. There’s no way to figure out how somebody did it now, except that it’s always done in more or less the same way. If you see someone hit a wall at 40 miles per hour, or you’re looking at a species that doesn’t exist, it is still hard to tell how much is stunts, how much is makeup, how much is a visual effect, because digital puts them all together in such a seamless way.

ERIC BREVIG: If it's done right, CG slips past the audience completely. I've even had it slip past the director. Pearl Harbor had four real planes that were supposed to be 20 — so we did a lot of them CG. Michael Bay was sure that the CG planes would never look real enough. But when we finally lit them and put them in there, I took the shot to him. 'Okay, here's the shot with the CG planes.' 'Fine, but I'm never going to accept CG planes.' And I said, 'Okay, tell me which one is the real plane?' And he looked and looked, and finally he points, 'This one!' And he was wrong. 'Nope, that's a CG plane.' And from then on, it wasn't an issue.



CINEFEX: So we have these really terrific visual effects in movies now. Is it possible we're getting too much of a good thing? Throughout movie history, visual effects were there to serve the story. Increasingly, it seems as if wafer-thin storylines are there just to justify big effects sequences. There are just more and more gratuitous effects.



NATHAN McGUINNESS: More shots is better for business! (laughs) But, yes, I've seen overuse in visual effects, and I think we should be the ones to say, 'Hey, listen, you don't need that.' We need to show some restraint. Obviously, there is a market for the Spider-Man and Lord of the Rings movies — all these big visual effects shows. But there are some great filmmakers coming up who don't even want visual effects in their films. I don't want to see visual effects movies every day. I want to see clever films like Forrest Gump or Master and Commander. But, for a while now, we've been going through this big, whiz-bang stage.

ROBERT SKOTAK: It's like listening to an orchestra playing all bombast, all 1812 Overture. You get visual fatigue. Yes, it's impressive; but because the effects are not saved for the big moments, they just don't seem special anymore. They're not savored. We just blow our wad and show everything.

PHIL TIPPETT: My analogy for this is late 19th-century symphonies. Everything got bigger and louder and noisier, with twelve endings — and it kind of burnt itself out. Is our industry going to go that way? Well, probably not, because these big summer visual effects pictures still make a boatload of money.

DENNIS MUREN: There is so much of it, and because we've been watching this stuff for 15 years now, it's just becoming repetitious. Special effects are not really special anymore. They're

everywhere. If I were a kid now, I wouldn't go into this line of work. It just wouldn't interest me. I'd see 20 effects film in a year, and I'd like maybe the first three or four — and that would be it for me.

CINEFEX: The Matrix films, especially the last two, are certainly representative of this trend — effects, effects, effects, almost without reprieve.

JOHN GAETA: I would have liked half the shot-load on those Matrix sequels. I advocated that, in fact, all along the way — smaller, but very potent battle scenes. The Burly Brawl could have been a third less and just as cool — maybe cooler. But the formula these days is action, action, action.

BEN SNOW: Van Helsing was jam-packed with effects, as well. It was a great thing for us, purely from a visual effects perspective, to have all of these challenges. It was great for us to work on eight different creatures — we all had a fantastic time! But in a situation like that, there is so much stuff, the work is undermined. If it becomes numbing for the audience, your work can get lost.

RICK BAKER: I thought the black-and-white stuff at the beginning of Van Helsing was cool. But then, it seemed like every couple of seconds somebody was climbing a wall or flipping over or doing some superhuman, impossible thing — one after another after another. And I just didn't care anymore.

ROBERT SKOTAK: A lot of the trouble with these films is that they're meant to keep your mind busy, rather than really engaged. They've become a visceral experience, rather than an emotional one. I think these tentpole movies are going to be around for awhile; but any system — and moviemaking is a system — has to adapt and evolve in order to survive. And I think that will happen. I'm hearing the voices of younger people — younger than the generation that grew up with videogames — and a lot of them are very serious about what is going to happen with the world. They are growing up under 9/11, and they're a little more issue-oriented. And they may want to see more drama in their movies. A healthy mix would be the best — some entertainment to escape, and some look at reality. Right now, we've overcompensated in the area of the E-ticket ride. At some point, we seem to have fallen in love with stupidity.

ALEC GILLIS: That's when I come back from movies, and say, 'I hate effects films.' I hate effects films that don't pull anything new out. They are striving so desperately to be visually cutting edge, and they come up empty. But then, every once in a while, I'll see a movie like Pirates of the Caribbean, which has a ton of effects in it, and I just go: 'Hooray! That's fantastic!' Same thing with the last Harry Potter movie.

TOM WOODRUFF: But the reason those movies stand out — it's not just that they have stand-out effects, they also have story elements. What makes effects work is storytelling.

VAN LING: You look at a movie like *Babe* — first really effective use of talking animals. But, frankly, the talking animal thing gets tiring after about five minutes, and you go, 'Okay, what else you got?' Well, they had a great story! A compelling and emotional story. There was something there to back up the effects work. I was dumbfounded by some of the work in the *Matrix* sequels. It was technically stunning. But it just didn't have much impact. It's like, how could something that looks so great be so boring? It has always been and will always come down to how you're using that technology to tell the story.

RICHARD EDLUND: Go back and look at *Star Wars*. That movie had heart. Of course, everybody liked being taken out of reality and deposited in a galaxy far, far away for a couple of hours; but the story is really what drove those movies. Visual effects just provided the splendid orchestra to support that visually.

STAN WINSTON: *Jurassic Park* wasn't successful because of the effects. *Terminator* wasn't successful because of its effects. *Lord of the Rings* wasn't successful because of its effects. They were all great stories. Yeah, there are good effects in all of them, but that's not what made them a success. Too often, a visual effects movie is a big success, and not-too-bright studio executives think it was due to the effects. They think, 'Ah, people want to see the spectacle!' — and we do. But we want to see spectacle supported by substance.

CINEFEX: The studios seem to be courting a fairly young demographic —

PADDY EASON: Younger and younger, it seems to me. The original *Star Wars* was aimed at a 10- to 15-year-old age bracket, whereas the prequels seem to be aimed at a five- to 10-year-old age bracket. And I don't know why that is.

CINEFEX: Do kids care about story and character and substance?

RICK BAKER: I guess if I was a 12-year-old-boy, I'd probably eat this stuff up. When I was a boy, I'd sit through half an hour of boring dialogue and not very good acting in a Ray Harryhausen movie just to see a 20-second stop-motion shot. That was enough to get me to see



a movie a bunch of times. But — maybe it's my age — I'd still prefer to see 7th Voyage of Sinbad than to sit through Van Helsing again!

STAN WINSTON: Everybody knows the difference between a good story and a bad story when they see it. You may be able to draw a kid into a movie with spectacle; but even kids, if that spectacle is not supported by substance, will not like the movie. They want to see a good story, even if they don't know they want that.

MATTHEW GRATZNER: We do appearances for kids at schools — anywhere from elementary-grade all the way through college — and we always ask them what their favorite films are. And they say, 'I liked the first Star Wars,' or Raiders of the Lost Ark or Ferris Bueller's Day Off. These movies were made 20 years ago! If you ask kids what they think of recent movies, they say the effects aren't as good as those in their videogames!

PADDY EASON: To me, as a thirty-something person, movies like The Mummy and Van Helsing are interesting to look at, and the work is fabulous — but they aren't all that interesting, because they're all spectacle. And once you've lost your willing suspension of disbelief, once you know you're looking at a bunch of pixels — then, why not just go and play a videogame?

CINEFEX: It does seem as though films are moving away from a narrative form toward something more experiential, more like a videogame experience.

DENNIS MUREN: Doug Trumbull's been saying this for years — they're like little thrill rides. And they're getting more and more that way. It makes sense. Games are more popular than ever, and the kids playing them are growing up and getting into the movie business. And if that's where their sensibility is, then those are the kinds of movies they're going to make.

HARRISON ELLENSHAW: The game business just doubled the revenue of the film business. Shouldn't that tell somebody something?

CINEFEX: Yeah, it's telling them, 'Let's make movies like games!'

HARRISON ELLENSHAW: You're right — that's what they're hearing. But what they should be taking from that is: 'Let's make movies that aren't like games. Movies are not games, so let's make sure they don't look anything like a game.'

TIM McHUGH: If the guys that crunch the numbers looked at *The Passion of the Christ* and *Fahrenheit 9/11* — both phenomenally successful movies made by individuals who were passionate about what they were doing — if they looked at how much was spent to make those movies, and what the returns were, they would realize that there is room for all kinds of filmmaking. We have pop music; but we also have rock and roll and country and rap and classical — all of these kinds of music exist somewhere. I think the filmmaking world just kind of got into the pop-music-only category.

Steve Begg: It's true that the videogame mentality is running the show at the moment — but I think that once that demographic matures, they will become bored with the rapid-fire pyrotechnic effects that we're getting now.

MARK STETSON: It's the maturity of the directors, as well. Some directors deliberately choose to go over the top. I've actually been instructed in the past: 'Go over the top. If we lose some of the audience, that's okay. This is what I want.' Sometimes they just have to get it out of their systems. I've worked for more than one that just wanted every single cool effect that he'd ever seen in his movie. But then he learned from that; and, having done it, he said: 'Okay, I've done that. Now let's make a movie with a story.'

RICHARD EDLUND: Special effects is like a racehorse that sometimes gets rode hard and put away wet. Because of the greed of the studios, the 'I want to rule, I want to make the most money this summer' — because, you know, money is the Purple Heart of moviemaking — a lot of empty-headed movies get made. Visual effects is kind of like the sword that has been pulled out of the stone by the studio, to use until audiences say, 'Enough already!'

BRIAN VAN'T HUL: These things go in cycles. Visual effects films are really popular, then they're not. So then, gritty, realistic films are really popular — no, wait! Here come visual effects films again!

Steve Begg: We may have one last flourish before everyone gets bored shitless with big, grandiose effects. We're at the crest of the wave right now; but ultimately, we're going to head back towards intelligent filmmaking with effects in the background.



RICHARD TAYLOR: I think we're already seeing it. More films are coming out in which digital effects are not being used as a way to wow the crowd with the technology, but rather being used subtly and beautifully. A movie that comes to mind is *Amélie* — what a beautiful and subtle use of digital effects, in a very traditional and non-effects type story. The digital effects were just there to bring a richness to that world.

RICHARD EDLUND: *Angels in America* had a lot of effects in it; but it wasn't effects for the sake of effects. Effects were part of the magic of the story, and they supported its almost Shakespearean dialogue. I think it's great that effects are starting to be used to support those kinds of movies.

ERIK NASH: To this day, one of my most fulfilling experiences in the business was on *O Brother, Where Art Thou?* A lot of people would look at that and say, 'What visual effects?' That's music to my ears. If I heard that about every movie I worked on, I would die a happy man.

CINEFEX: Increasingly, it seems effects are being used in those kinds of non-effects movies, and by non-effects filmmakers.

BILL TAYLOR: It's been very gratifying to see people who don't make popcorn movies — people like Martin Scorsese — embrace this technology. I think we did the first trick shot ever on a Scorsese movie for *Cape Fear*. Marty had never done a visual effects shot in any movie, to my knowledge — but he knew how every visual effects shot in every other movie was done. He just grasped the technology, embraced it, and has used it to great effect, both with us and without us. There's a much wider range of movies and moviemakers who are open to using visual effects, even in straight dramas.

CINEFEX: So, perhaps, effects will be more restrained and tasteful as more directors with taste use them.

PHIL TIPPETT: Look at the best, most satisfying films using visual effects that have come out this past summer — *Spider-Man 2*, *Hellboy*, and, in a less fantasy vein, *Master and Commander*. What is the common denominator? They were all made by experienced filmmakers, pure and simple. They aren't just driven and marketed by corporate franchise mentalities hiring first-time video directors.

KEN RALSTON: You always do your best work when you are in the hands of someone with a vision — whether it is Bob Zemeckis or Steven Spielberg or Jim Cameron, or anyone of that ilk. If you don't have vision, you've got nothing — zip.

STAN WINSTON: Sadly, there are only a handful of really visionary directors, producers and studio executives...

ROBERT SKOTAK: In any area — car design, science — there are few geniuses, few really talented people. And there are few people out there who can make a great movie. Usually, the ones who love doing it are the ones who can make a great visual effects movie, where the effects blend and aren't the reason the movie exists.

CINEFEX: Is it really a matter of there not being enough visionary filmmakers? Or is it the studio system — the fact that movies aren't being made by moviemakers anymore, they're being made by CFOs and marketing people?

STAN WINSTON: Whose fault is that? To make it as a filmmaker, make a small film. Then, when you're strong, take a stand. Jim Cameron started off demanding what he wanted to do as a filmmaker, even with a very small-budget film like Terminator. You hear directors say, 'Well, I didn't have any choice, because I had to deal with these producers or that studio or whatever.' I'm sorry, that's B.S. Part of being a director is knowing how to deal with all of those people, knowing the right battles to fight. Ultimately, it's your responsibility. Bad film — director didn't do a good job. Great film — hand it to the director. Studio execs are always going to be breathing down your neck, wanting to watch the budget, wanting to put in stuff. You fight the battles. It doesn't kill a good movie to have a really big effect — so the studio wants that effect in there? Fine. It doesn't mean that you have to surround it with a stupid scene, bad writing and bad acting. No, I don't blame the sorry state of movies on producers or on the studios. I blame it on directors who aren't tough enough to do what Peter Jackson did, what Jim Cameron did.

JEFF OKUN: There are made directors who fight the studio and the producers — they are going to do it their way, no matter what. And there are a few newer directors — like David Fincher and Michael Bay — who will say, 'This is it, this is what I'm doing, and I will fight you as long as you want to fight.' But many others are just so thankful to be getting a chance to direct, they don't want to screw it up.

STAN WINSTON: And sometimes studios hire directors because they're 'directable.' I've heard it so many times — 'He's good because he'll listen and direct it our way.' That's not a director, that's a puppet.



RICK BAKER: I always say that I'm the only person in Hollywood who doesn't want to direct. But the truth is, I'd like to direct a monster movie, if I could make the movie I wanted to make. But the way movies are made now, directors pretty much don't direct movies. The producers, the studio execs all have something to say about who is in it, how it is shot, the whole thing — and it's destroying movies. I've had experiences where the director was just there, just somebody who said 'action.'

JEFF OKUN: The professionals aren't being allowed to direct movies anymore — the studios don't want to hire them. The director is becoming an interchangeable part, like cameras. But when you are lucky enough to work with a guy who knows his stuff, it is day and night. I was talking to Mike Fink, who has been working with a first-time director on Constantine. Mike is very wry, and he said, 'I'm having a lot of trouble adjusting to this thing.' And I said, 'What do you mean?' He said: 'Well, this director tells me what he wants, then he tells me what day we're going to do it, and then the day comes, and we actually do it, and we put the shot together the way he wants it, and he actually likes it, and we move on. I'm just not used to working this way...' So, hopefully, this director will get more work. But for every one of those, we've got 20 who've shot 35,000 music videos, and they're going to show the world how to make a movie.

CINEFEX: Probably all of you have had the experience of laboring on a movie for a long time and with great care, only to have that movie fail, either critically, commercially, or both. How does that make you feel?

STEVE JOHNSON: Like shit. (laughs) No, actually, I've removed myself from that. It used to really bother me, because I poured my heart into things, and attached myself to not only the quality of what I did, but to the quality of the film. But I realized that it doesn't have anything to do with me whether the film turns out or not. It's like what Stephen King said once, when he was asked about some of the movies made from his books. The interviewer asked, 'How do you feel when someone ruins one of your books?' And he said: 'Nobody ruined my books. They're right there on the shelf.'

JEFF OKUN: Look at Cutthroat Island. I thought Cutthroat Island was the best work I'd ever done, up to that point — and that movie was the biggest bomb of all time. And it wasn't my first. In fact, last year, in the Hollywood Reporter, in some article they did on The Last Samurai, the lead paragraph said: 'Jeff Okun, known for doing great effects in crummy movies...' That will probably be on my tombstone. But, I learned a long time ago not to bemoan the fate of a movie, because, ultimately, we are not in control. All you can do is look at the stuff that is good and be proud of that work, regardless of the criticism of the movie. At the end of the day, you stand alone amongst your peers, and the work stands up or it doesn't, on its own, regardless of how good or bad the film itself is.

MATTHEW BUTLER: There is always some payoff in making a movie, too, even if it turns out to be bad. You always learn something. And it's worth it if you feel a part of the process. People will do anything with enough encouragement and pats on the back. Some directors are good at that — like Rob Cohen. Others are never going to thank you for anything. And you're looking for that, above and beyond how good the movie turns out to be.

JAMIE DIXON: When we take a job, we try to make sure that there's something that we will be able to take out of it. Because, then, if the movie turns out badly, at least we didn't waste our time. So we know why we're doing it — to learn something, to create a new tool, to work with certain people. You have to find something that makes it a winning proposition for you, no matter what happens with the movie. And, if you're lucky, you get a big moment. You get a moment like the shot we did of Samuel Jackson getting killed by the shark in *Deep Blue Sea* — a shot everybody was talking about for months. If you're not lucky, you do something that dries up and disappears. And all you can do is hope it wasn't your fault.

CINEFEX: There is a view among film critics that it is your fault — that effects are responsible for the demise of the American cinema. According to them, you guys are ruining movies.

STEVE JOHNSON: That's not a fair rap at all. I would say commerce is the culprit, because the filmmakers, the producers, the studios are catering to the lowest common denominator. The *Stepford Wives* being remade? *Starsky ... Hutch*? Wouldn't anyone rather read a book than waste two hours on *Starsky ... Hutch*?

KEN RALSTON: If the public wants to flock to some lousy film and help it make \$300 million, well, then the studio is just giving the public what it wants.

GRAY MARSHALL: And if the audience stops going to those kinds of movies, I guarantee you that the Darwinian law of economics will kick in and those movies won't be made anymore.

KEN RALSTON: Whether a movie is good or not is all in the hands of the director, anyway! It's not like the visual effects guy is sitting there, saying, 'This is what we're going to do.' I would love to have that kind of power, to walk in and tell everybody what they're going to do in their movie!



KEVIN HAUG: It's like: 'Oh, yeah — you're the director, and we're going to come in and remake your movie? The AV geeks of the high school of life are going to take over your movie?' It's a silly idea. Death of cinema, my ass...

MATTHEW GRATZNER: Every jackass movie critic is railing against effects films; but effects were never meant to carry a movie. They were supposed to help tell a story and do things that you couldn't do for real. So don't dog the visual effects people — all they want is to do a good job. Blame the studios, because they're putting scripts into production that are terrible. If a high percentage of these films didn't have effects in them, they'd be unwatchable. You couldn't watch a film like — well, I won't start naming them. But there are a couple of films out there that, without the effects, would be like watching a junior high school play.

KEN RALSTON: No one is stopping a studio from making good, smart movies. And you can make smart movies, for adults, with visual effects. You can make Citizen Kane — or you can make The Giant Claw.

CINEFEX: It's crystal-ball time now... What do you think will be the next quantum leap in visual effects?

VOLKER ENGEL: I don't see one big leap. I see a lot of small technical innovations coming our way. Everything will just slowly get better and faster.

JOEL HYNEK: Especially faster. Seven years from now, we'll be talking processing speeds of 10 terahertz. That's 10,000 times more than what we have right now, which will be an incredible turnaround.

ROBERT SKOTAK: I think we'll see holographic movies, movies that play directly on the brain. You'll be in a holographic environment, a cube of entertainment, instead of looking at a screen. Because of technology, movies are going to start reaching out of the screen. Another interesting thing I can imagine is that every movie you get on DVD would have a little variance virus that would slightly shift angles and things. So that every time you watched it, it would be a little different and would introduce some random things that would have occurred in real life.

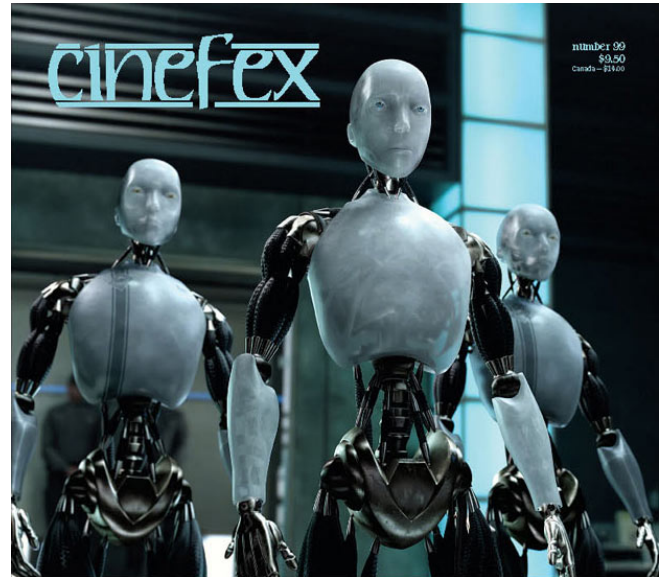
JOHN DYKSTRA: Alternate endings. At some point, computers will get fast enough to where they can do really sophisticated alternate endings. And it will be viable to make a cross between a theatrical motion picture presentation and the videogame that you play sitting on your couch.

CINEFEX: So, one future of the entertainment industry will be a kind of crossover between gaming and cinema?

JOHN GAETA: There's going to be a full-on collision. That's where the biggest changes are coming. In the last three or four years, what's been most explosive in gaming is tournament play, in which people watch matches between other people — almost like a sports event. And, with high-definition theaters coming, you'll have people going to that kind of interactive entertainment in theaters. There will be an overlap of game and film techniques to create a hybrid multimedia type of experience.

HENRY LABOUNTA: I think there will be film influence on games, and game influence on films. But I don't think movies are going to go away. People will be going to theaters and watching movies for quite some time to come. But if you were to look at a film that will be created 10 or 20 years from now, I would imagine it would be considerably different. I'm particularly excited to see, as the audience matures and there's a market for more mature themes, where nonlinear storytelling will go. I think that has some really interesting challenges for people from the film industry — to take what they've done with a linear medium, and apply it in an interactive way in which the players feel like they have control and they're influencing the story. That's an incredible challenge. Nobody has really cracked that nut yet.

CRAIG BARRON: I hope we're moving toward a different kind of movie. Maybe movies that explore surrealism, for example. As it is now, a lot of the movies are very similar, and a lot of the effects are similar, and they become stale after awhile. So I try to project forward and think about what are some other ways that we might tell stories, and how might visual effects be a part of that? In the 1890s, audiences described how the films of the Lumière brothers were like still photographs that magically came to life. Georges Méliès and other magicians used cinema as extensions of their magic acts. So, if cinema was born as a visual effect, it might end as one. Perhaps Méliès and Lucas will be the two Georges that become the bookends of cinema.



CINEFEX: Cinefex is celebrating its 'silver' anniversary. Some of you are approaching, or have passed, similar landmarks in the visual effects field. Any final thoughts as you look back over those years?

RICK BAKER: I just feel so fortunate to have made it. I remember when I was trying to get into the film business, and everybody was talking about how it was impossible to get in — but I just knew that this was what I wanted to do, and I was going to do it whether I got paid for it or not! I was that passionate about it. And, you know, it's always the people who are passionate who change things and make advancements. The Dennis Murens and the Phil Tippetts and the Ken Ralstons — we were all just fans of this stuff, and we wanted to do it better than people had done it before. And we changed the business. I hope there are still young people out there who are passionate about this work.

TIM McHUGH: What drew me and most of the people I work with to this business was the magic of filmmaking. And we're trying to keep that alive. I feel like we're huddling around the fire in the rain, trying to keep the sparks going...

KEN RALSTON: Movies, despite what some of them have turned into, have an artistry to them — and some of us are trying to keep it that way. Phil, Dennis, me, Rick — we were all kids together, and we didn't get into this for anything other than the love of the work. We just loved visual effects. We still do.

DENNIS MUREN: I remember when we were doing Ghostbusters, one day I was walking the halls of ILM with Michael Gross, one of the producers, and he said: 'You know what all of this is? All of this is some guy seeing Werewolf of London or something like that, and noticing that when the character changed from one thing to another, it didn't look right. And it just bugged him. And bugged him. And all he wants to do is get that right. That's who we are...' I think Michael was absolutely right. We're still doing that, still trying to get it right, still trying to get past the things that bugged us. And still, I suppose, trying to capture the feelings we had about it all when we were ten years old.

Thank you, everyone.

A Dream of Christmas

ARTICLE BY JOE FORDHAM

In little more than 1,000 words and 15 large-format oil pastel paintings, Chris Van Allsburg's book, *The Polar Express*, told the tale of an unnamed boy who receives a visit one Christmas Eve from a phantom locomotive that arrives outside his bedroom window and carries him to the North Pole to meet Santa Claus. Rendered in a lush, romantic style, accompanied by simple, elegant prose, the story told how the fantastic journey helped the boy face his growing suspicion that 'there is no Santa.'

The slender volume sold more than five million  copies, won the 1986 Randolph Caldecott Medal for the most distinguished American children's picture book, and became a perennial bedtime story for many children and their parents — including actor Tom Hanks, who, in late 2000, presented a copy to filmmaker Robert Zemeckis. "There was a little Post-It note on the book," recalled Ken Ralston, longtime Zemeckis collaborator, five-time Oscar winner and senior visual effects supervisor at Sony Pictures Imageworks. "It said, 'Can you do anything with this?' Bob went crazy for it! It shocked me at the time because the book took five minutes to read. So I asked Bob what he was going to do with it, and he replied: 'That's what I love about it. It's a clean canvas. I can do whatever I want.'"

Warner Brothers Pictures and Castle Rock Entertainment had previously investigated developing the material as a live-action feature film, under the aegis of director Rob Reiner. With Hanks and Zemeckis attached — their Playtone and Imagemovers production companies joining forces with Golden Mean and Shangri-La Entertainment — the project took shape in another form.

Instead of a purely live-action adaptation, Zemeckis sought to bring Van Allsburg's book to life using digital animation, somehow integrating Hanks' performance. To explore narrative and technical parameters, Zemeckis hosted a series of meetings with key collaborators. "Bob brought together a small group of talented folks," said Ralston. "There were production designers Doug Chiang and Rick Carter, and Bob's producer Steve Starkey. We all met periodically with a team of storyboard artists while he was developing the story outline. While we tried to figure out how to do it all, Doug started conceptual art and Rick Carter researched directions to go with set pieces. That went on for months. It was a very exciting time, with a great group of creative energies in one room, all throwing out ideas, exploring many different directions that never made it into the movie."

The brainstorming sessions resulted in a 270-page treatment written by Zemeckis and screenwriter William Broyles, Jr., which included some fanciful embellishments to the story. The film first took shape in the form of a story reel, cut from storyboards and temporary dialogue, while Imageworks fleshed out more complex action as 3D previsualizations. The basic

methodology for animating the film, however, had yet to be defined. “All we knew,” said Ralston, “was that Bob was making this film with Tom and we didn’t want to throw Tom’s performance away. The challenge was to create a CG feature where the performances on screen were as effective as live-action. In a live-action film, we take for granted all the emotional nuances that come through a performance. To translate that to CG, we had to create the illusion of that level of performance.”

Research and development ramped up in June 2002 with a series of tests exploring three options for depicting the film’s opening. The first test was comprised of a bedroom set, lit and shot by director of photography Allen Daviau to resemble the book’s illustration style, with Hanks playing the boy in full costume and makeup. The second test involved Hanks in makeup and costume as the train conductor, playing opposite a child actor in a minimal, mostly bluescreen set. Ralston predicted the cumbersome, time-consuming aspects of the bluescreen setup would make the third option — his preferred approach — look favorable in comparison. “I saved the best for last,” Ralston commented, “because I knew that the only way to get the movie done would be with motion capture technology.”

Hanks enacted the third test playing the hero boy in an oversized bedroom set blocked out by marker tape and skeletal doorframes, in a motion capture setup supplied by House of Moves. Hanks subsequently performed facial motion in a closeup rig, wearing 100 motion-tracking markers. Imageworks would then reconstruct his performance by uniting the face and body moves. Zemeckis quickly saw the benefits of the process. “Bob loved how simple it was,” declared Ralston. “There was no waiting on lights, cameras or costumes, and it gave him total freedom to select performances and camera angles.”

Imageworks used seven shots from the test to explore animation techniques, blending motion capture and keyframe animation. “In our early test,” stated animation director David Shaub, “we found where all the hurdles were going to be in translating adult performances to children. Adults don’t move like kids. When Tom Hanks came running out of the house, as the boy running up to the train, he still looked as if he was six-feet-one-inch tall. We sped up the data to make him less rigid in the swinging of his arms and, through keyframing, tried to ‘kid it up’ a bit.”

Simultaneous to animation research, Imageworks explored rendering options to capture the look of the book’s illustrations. Van Allsburg visited Imageworks to explain techniques he had used to create those illustrations, such as handcrafting imagery using sticks of Caran d’Ache oil pastels. “We studied the layering process of pastel drawing,” stated senior visual effects supervisor Jerome Chen, who shared duties with Ralston on the project. “Usually pastels can be done in a very impressionistic style. Chris’ drawings were stylized, with a high contrast ratio of strong light sources and shadows; and his characters were human-proportioned, not ‘cartoony’ at all.”

Imageworks applied their observations to stock footage from an earlier live-action project. “We took a scene from the first Spider-Man,” related Ralston. “It was a sequence with two characters in conversation on a rooftop, with buildings in the background that looked a lot like Chris’ sketches. We did some very simple Inferno work and introduced textural tricks and

sketchy looks.” Ralston and Chen also investigated optical flow rendering techniques — tracking textures to pixels of live-action footage, as seen in *What Dreams May Come* — and explored academic papers for emulating the looks of pen and ink, watercolors, pastels and oils.



On Christmas Eve, a thunderous rumble and a blaze of light wakes the young unnamed protagonist of *The Polar Express*, heralding the beginning of a lush, animated Christmas fantasy. Based on Chris Van Allsburg’s award-winning book and directed by Robert Zemeckis, the Warner Brothers production takes the boy on a trip to confront his burgeoning disbelief in Santa Claus, while taking audiences on a visual journey realized entirely with computer generated environments and performance-captured actors. Supervised by Ken Ralston and Jerome Chen, the groundbreaking work required years of research and development and a complete retooling of the animation pipeline at Sony Pictures Imageworks.



The lead character – known only as ‘hero boy’ – confronts a gigantic, hissing steam locomotive and its guardian, the conductor, on a snowbound suburban street in front of his home. Tom Hanks performed both characters, as well as three others in the film, on a stage at Sony Culver Studios that was rigged for simultaneous facial and body performance capture. Dubbed ‘Imagemotion,’ the process allowed Zemeckis to acquire all performances using adult actors, then introduce camera moves using a real-time virtual camera interface known as ‘Wheels.’ Modelers and animators brought characters to life in digitally rendered settings reminiscent of Van Allsburg’s book illustrations.



All CG characters began with scans of life models. Modelers generated heads from that data and from photographic textures of performers' faces. Imageworks modeled the hero boy after Josh Hutcherson - who had performed motion capture duties on the Imagemotion stage - then subtly modified the nose, mouth, eyes and brows to make the character more closely resemble Tom Hanks. Imageworks animated creases and folds in the boy's and all the characters' clothing, applying dynamics simulations to create the flowing movement of fabric and hair.



To translate performance capture data to CG characters, Imagemotion integration supervisor Albert Hastings led a 25-person integration team in applying motion capture data to gray-shaded digital models. After Zemeckis orchestrated virtual camera moves, animation director David Shaub and a team of 42 added keyframed touches such as intricate eye movement and lip sync. To aid the animation process, which strove to retain as much of Hanks' performance as possible, the production documented the Imagemotion shoot with 12 video cameras, providing animators with valuable reference.



Ken Ralston and Jerome Chen review performance capture material with Wheels operator Alex Head. Performers on the Imagemotion stage wore spandex bodysuits covered with 80 retro-reflective markers, and had 151 additional markers affixed to their faces. Suited performers were surrounded by 72 motion capture cameras. The production mapped the studio floor with a grid of one-foot squares, enabling the set crew to lay out footprints of virtual sets using plywood sheets taped with placement diagrams. Zemeckis then blocked scenes with actors wielding wireframe props, often making use of mechanical effects devices to assist with physical set interactions.

The research resulted in Splat — ‘Sony Pictures Layered Art Technology’ — an impressionistic brush-stroke tool that produced a painted, stippled appearance by attributing particles to imagery and affixing textures to each particle. “When we rendered a CG version of our characters,” said digital effects supervisor Rob Bredow, “Splat applied a pastel render look on top, creating the effect of many pastel brush strokes layered on top of one another.”

The effect, however, seen in motion, detracted from the emotional impact of a scene. “From day one,” confessed Ralston, “I was worried that a paint technique was going to make characters look like they had leprosy. Then, when we projected our first tests, I sat there looking at it and I realized, ‘I — hate — this!’ It was so two-dimensional, even with all the three-dimensional effects going on, the whole world felt flat and limited.” Rather than pursuing a painterly procedural approach to rendering, Imageworks instead adopted a rendering style that more closely imitated Doug Chiang’s digital conceptual art. “Doug’s artwork opened up the spaces and gave us a sense of a world we could technically create. Jerome and I then came up with lighting schemes, atmospheres and textural details to make each scene unique.”

To develop characters, Imageworks character designer Vladimir Todorov first created conceptual renderings, then modelers sampled photographic textures from live performers. Zemeckis cast Hanks in five of the principal roles — the hero boy, the boy’s half-seen father, the train conductor, a mysterious new character known only as ‘the hobo,’ and Santa Claus — and used additional adult motion capture performers for 30 other child characters encountered on

the train. “Bob knew he could get a higher degree of performance out of adult performers,” explained Ralston. “We briefly considered digitally re-sculpting the images of our adult performers to make them look like children; but we didn’t have 20 years to do that, so we scanned real children, took their forms and used those as our kids.”

Rick Carter’s art department laid out the virtual world, generating elaborate blueprints and designs for virtual props and sets, geared toward a three-month motion capture shoot. To more accurately reflect the importance of the motion data acquisition phase of the production, the process was renamed ‘performance capture’ and was eventually registered with the Sony trademark ‘Imagemotion.’

With the film officially greenlit, Imageworks ramped up for production on Stages 2, 3 and 4 at Sony Culver Studios, taking advantage of an existing fiber-optic link connecting Imageworks to those stages, and subcontracted Giant Studios to equip the largest stage for body capture only. At the same time, the team rethought the separate face and body capture that had been done for the test footage. “We realized that shooting facial capture separate from body capture was not ideal,” said associate producer Debbie Denise, “and that we would achieve a much better total performance by shooting both together.”

The Imagemotion team tied a facial animation rig developed by digital effects supervisor Alberto Menache for the test with a muscle-based body animation rig originally built for Spider-Man by J.J. Blumenkranz. “J.J. refined the body rig to make it leaner so we could handle a lot of characters,” related Menache. “We combined our facial-muscle system with the body-muscle system controls, and then added another layer of motion capture controls on top of that.” Imagemotion supervisor Demian Gordon defined parameters of the face and body capture volume utilizing Kaydara’s Motionbuilder, and determined that the production would require a record-breaking number of motion capture cameras on the stage. “We were looking at no less than 64 cameras. The maximum that had ever been done before was 32, which Demian had used on the Matrix sequels. No vendor could come close to the camera counts we needed, but Vicon agreed to jump into some core development with us. They suggested linking four of their existing motion capture systems, gathering all the data, then merging it together.”

The 64-camera system eventually grew to 72 cameras, with 64 cameras targeted at the face and 16 targeted at the body. Each facial-capture camera targeted infrared light at performers through a 50mm lens; whereas body-capture cameras used wider 25mm lenses. Motionbuilder interpreted data within volumes of space surrounding the performers. “We were shooting for a three-foot-tall cylinder around each actor,” commented Gordon. “We ultimately ended up getting a lot more than I had hoped for, allowing the performers to move about in spaces ten feet in diameter.”



En route to the North Pole, the hero boy clammers atop the speeding train and encounters a mysterious hobo – another Hanks persona. Hanks posed for scans as the hobo in costume, wearing facial prosthetics designed to give his character a lantern jaw and broken nose. Imageworks tweaked the prosthetics digitally to give the hobo a more gaunt appearance. Effects animators then textured the scene with a stream of high-speed snowflakes,

To assist in the accumulation of performance data, director of photography Don Burgess covered the Imagemotion shoot with 12 video cameras.

Performers wore 151 reflective motion capture markers on their faces and 80 reflective markers on spandex body suits, and moved about the studio floor, which was marked with a grid of one-foot squares used to align imaginary sets. "The set department brought in four-by-eight luan plywood sheets taped out with set diagrams," said Gordon. "Before the shoot, we placed them on the floor, laying out all the elements required for that particular scene. We'd then pull the luan off, move on to the next scene and, if we had to go back, we'd put the old piece of flooring down and everyone could keep track of where we were in the virtual environment."

Construction crews built motion capture sets using apparatus named — after the director — the 'Z-bar kit.' "It was like adult Tinker Toys," stated Gordon. "Whenever we needed an interactive set piece or prop, we'd cobble it together on the fly from metal rods and connectors, giving actors just enough to touch and get their head around where they were. We could then break it down and turn it into something else."

Skeletal sets were necessary to reduce occlusion. "If ever we occluded markers from the camera," observed Ken Ralston, "we were losing data. The more holes we had in everything, the more chance we had of getting that motion to read; so we put markers on our props and used that data in our animation." The production built a range of 'chicken wire' props, fabricated out of wire mesh and steel. Special effects supervisor Michael Lantieri designed mechanical rigs for more complex set and actor interactions.



Starting with an image of a pack of timber wolves observing the passing train, plucked from the pages of Van Allsburg's book, Zemeckis catapults the audience on a dizzying journey through a winter woodland, following a lost train ticket caught in a breeze. One of the most ambitious scenes conceived for the film – and the longest in production – the two-minute ticket ride featured a menagerie of entirely keyframed wildlife, including wolves rigged with expressive muscle, skin and fur simulations.

When adult actors were portraying children, sets were scaled up 120 percent. Performers portraying adults in those scenes wore 'snorkel' backpacks equipped with a three-foot rod, capped with a target ball to provide eyeline reference approximately nine feet above the stage floor. To help orient action on the motion capture stage, filmmakers referred to storyboards, previsualization, conceptual renderings and art department foamcore models of environments.

The malleability of the Imagemotion system allowed Zemeckis to capture performances in chronological story order — a rare luxury for a feature film — however, the size of motion capture volumes required the wide master shots to be enacted on the larger stage, with face and body closeups captured on smaller stages. "As soon as Tom recorded a master," explained Ralston, "we would go to the closeup stage as quickly as possible and Tom would reenact the scene, breaking down his performance in ten-by-ten pieces: 'You know, I...' — then he'd walk back, start again — '...really think we should...' — then he'd walk back, start again — '...get on that train.' We were bouncing all over the place, getting that to work."

Imageworks applied the performance data to gray-shaded representations of characters inside simplified CG versions of environments, and integrated Zemeckis' selected takes, sometimes combining portions of different takes into one performance. The rough, gray-shaded scenes served as a proscenium into which Zemeckis introduced camera moves using a virtual camera system called 'Wheels,' developed with Robert Presley — Don Burgess' long-time camera operator, who shared a joint director of photography credit with Burgess on the film. Wheels allowed operators to manipulate the CG camera using controls similar to pan and tilt mechanisms on a geared camera head. Joe Lewis at General Lift developed a prototype Wheels interface, and then motion control engineers Simon Wakely and Chris Bangma devised two further versions based on a Libra remote head. "Robert worked with Bob, rotating the wheels to create real-time camera moves in our virtual world. It gave the film a live-action feel like no other CG film."

Zemeckis covered each scene as if it were live-action — master shots, close-ups, reverse angles, tracking and crane moves — occasionally transcending physics by allowing the camera to travel through windowpanes or keyholes. The Wheels team created handheld camera effects by motion capturing an operator wielding a motion picture camera, and created gliding Steadicam-style moves by manipulating a videogame-style control pad — all recorded in real time.



The lost ticket is snatched from aloft by an eagle and presented to an eaglet, seen in one of the sequence's seven digital environments.



The conductor tugs on the beard of Smokey, one of the locomotive's bumbling engineers, modeled after a performance by the late Michael Jeter, to whom the film is dedicated. After Jeter's death partway through production, Imageworks elected to complete the actor's portrayal of Smokey and his rotund counterpart, Steamer, starting with scans of the actor in costume and prosthetics, then keyframing the characters' scenes. Artists blocked out scenes using storyboards and animation paper before progressing to keyframe animation.



The Polar Express encounters a huge herd of caribou that blocks the tracks. Imageworks modeled the caribou from photographic nature reference, rigged the model with dynamic muscle, skin and fur simulations, and then developed walk cycles and other keyframe behaviors. Caribou seen in closeup, illuminated by the locomotive's headlamp, were animated as hero characters, with close attention to facial detail. Imageworks employed a flocking system to populate the tundra with some 100,000 other caribou, sampling keyframe animation cycles and applying moody lighting to fade the herd into the distance.

Zemeckis and his film editors then assembled scenes while Imageworks gathered data, catering to the new production paradigm. "When Wheels was generating all this camera data," commented Imageworks digital producer Chris Juen, "what we were calling 'shots' were really camera angles. Wheels generated approximately 3,600 angles. Keeping track of every one of those in a traditional shot method would have driven us insane." To handle data output — the biggest in Imageworks' history — Juen's team developed an asset-based tracking system that catalogued and cross-referenced sets, characters, costumes, props, matte paintings and effects.

The production accumulated 3,942 assets, requiring 38 terabytes of data, distributed by 1,300 processors, and featured in 798 shots in the 92-minute film.

The opening of the film drifts through a snowbound nighttime street, one of several hundred moving matte paintings supervised by Ivo Horvat, generated using Maxon's Cinema 4D and Body Paint 3D. The street was based on photographic reference of the Grand Rapids, Michigan, neighborhood where Van Allsburg was raised, and was dressed with period cars. "We didn't want this to feel like modern day," observed Ralston. "The book has a strange timelessness — a simpler, naive, beautiful time — so we figured it was the '50s. There was no direct reference to that period, but we didn't want to see Playstation 2s under the tree. We wanted old-fashioned metal trucks and big packages filled with gifts you might imagine from your childhood. It was like a dream of Christmas."

The camera reveals the hero boy lying in his bed, unable to sleep — a crucial moment establishing the look and lighting of characters in the film. Imageworks built its model of the hero boy using scans of Josh Hutcherson, a young performer who had performed motion capture as the boy's stand-in. "Josh was very photogenic," noted Jerome Chen, "and he fit the character of the boy in the book, so we scanned him and modified him to have some of Tom's features, remodeling his nose and mouth, his eyes and eyebrows. Tom acts so much with his brows, and Josh's eyebrows were shaped differently, so the acting didn't come across as well with our digital boy. When we arched Josh's eyebrows like Tom's, though, suddenly we could see moments when the character's expression in the eyes looked exactly like Tom. It was eerie."

To animate the scene, Imagemotion integration supervisor Albert Hastings and members of a 25-person integration team applied motion capture data to gray-shaded CG models, laying a foundation for the director's virtual camera moves. Hastings' team then smoothed blends between takes, cleaning up the data before handing shots to keyframe animation.

The integrated models included facial detail down to skin movement surrounding the eyes, but characters were eyeless and consequently lacked emotion. "It took a lot of time to create an emotional connection with the characters," asserted Ralston, "and the eyes were the key to making that believable. I'm not a minutia guy, but I had to become one for this film. I learned words I never knew before — like 'caruncle,' the gland right outside the tear duct; 'meniscus,' the little bit of moisture that gets formed between the eye and the eyelid; and the 'sclera,' the white outer coating of the eyeball. That sclera brightness was killing us, so we had to keep knocking that down. It was worth going into so much detail to create a feeling of wetness and eye glints."

Eye geometry included a corneal bulge, which deformed the eyelid when eyes were closed. Eyelashes were modeled as RenderMan curve primitives generated at render time. Illusions of translucency in the iris were created as a shader function during rendering — a factor that led to unexpected anomalies. "Animators used low-rez representations of the eye," noted digital effects supervisor Sean Phillips, "so the eyes didn't have that refractive function while they were animating. Sometimes, in shots that were a little more side-on, when we rendered characters they appeared to be looking slightly off from the way the animators had intended. That took some back and forth to correct."

Eye animation required a complex interplay of muscle simulations and keyframe finessing. Eyeballs did not simply roll in their sockets; instead, the meniscus layer created liquid suction between the eyeball and the surrounding tissue, so as the animator moved the eye, the soft tissue reacted, producing shape changes built into the rig. “The skin followed the eye but not exactly,” noted David Shaub. “There was a little bit of sliding, to make it as organic as possible.” Keyframe controls included corneal controls, eyelid controls and lid follow-through. “Animators could override any automated values in the rig to correct any light refraction errors that appeared when we got into lighting.”

Eye blinks were a semi-automated keyframe function. “There’s so much more to an eye blink than simple open/close,” related Shaub. “A blink also pulls laterally, so as the lid comes down it pulls in muscles on the sides of the eye; then it pushes on the lower lid as it closes, which makes it feel soft and squishy. We built an approved blink and created a button that animators could hit and pop in animation curves.” Eye motion also included naturalistic nervous ticks. “Eyes are never at rest. The receptors in an eye cover a small area, so the eye is constantly searching for information in short little bursts of movement called ‘saccadic moves.’ There is always a saccade followed by fixation, and it’s always very fast. When we coupled that with eye-shape changes and lighting, we started to see thought. And we did that for every shot in the movie.”

Lip sync, too, required keyframe animation to add life to mouth interiors and insides of lips. “Motion capture gave us animation in the cheeks as the characters were speaking,” said Shaub, “but lip sync often felt soft. Video reference was invaluable, but if we emulated exactly what Tom was doing, it looked wrong. So we pumped up phonemes, made him really enunciate his ‘m’s and ‘b’s and ‘p’s.”

Digital characters also required a new approach to cloth and hair simulation, due to the large number of characters in the film. “This was more than ten times the amount of cloth we’d ever done for a movie,” remarked Rob Bredow. “If we had used our traditional techniques to do cloth simulation, we might have needed 150 people on our cloth team alone.” Previous Imageworks cloth simulations had showcased a panel-based approach — where artists tailored digital costumes to characters and then applied dynamic simulations to the CG fabric. For *The Polar Express*, Imageworks cloth and hair supervisor Sho Igarashi used scans of performers in full costume, then animated and enhanced existing folds and creases. “When a character relaxed, all the folds had to slacken realistically. When the character took different poses, we added new wrinkles. That put more load on the simulator, but it reduced build times on each character by several weeks.”



The *Polar Express* goes hurtling on a dizzying rollercoaster ride, derailing itself on a frozen lake whose surface shatters under the weight. The ice lake sequence was realized through a combination of shatter simulation software, augmented with noise simulation and activated using a series of procedural triggers positioned along the train’s path. Imageworks generated an underlying water surface to create gushes of liquid erupting through the ice. The giant locomotive, based on a vintage Van Sweringen Berkshire steam engine, was rigged with drive mechanisms that functioned automatically as the wheels rotated.

After awakening in his bed, the boy steps from his house into a world full of snowflakes — several million animated particles rendered in simulations generated from six 3D-modeled flakes. Imageworks generated a vast number of snow flurries in the film in a relatively efficient manner by only rendering particles visible to camera. Effects animators dialed in speed and turbulence and rendered snow in color-coded passes indicating proximity to camera — red signifying foreground, green midground, blue in the back. Compositors then created opacity levels to layer the snow with blur and depth-of-field effects.

All atmospheric effects were rendered in Splat, using image-based matting to insert snow behind objects. “The scenes requiring snow were incredibly complex,” stated effects animation supervisor Daniel Kramer. “Adding all that snow and trying to render against it, making sure snow was going behind the characters in the right place, would’ve been extremely time consuming. Using image-based matting, we could render a scene, then render out either a z-depth-based image or a RenderMan Deep Shadow image — rendering shadows with transparency and volumetric information — from the camera’s perspective. The software could then tell ‘geometry exists 200 meters away,’ and when a flake passed behind that, it would simply turn it off. That gave us very complex matting geometry and extremely efficient renders.”

One of the most complex characters seen in the film is revealed in a pall of steam and engine smoke — four carriages, observation car, locomotive and tender comprising The Polar Express. The train was based on a vintage Van Swerigen Berkshire 2-8-4 locomotive, which the Michigan State Trust for Railway Preservation and the Pere Marquette Historical Society made available to the production. The art department measured and photographed the train, and visual effects art director Marty Kline, a train buff, supplied additional reference of piston function and locomotive details. Drive mechanisms were rigged to function automatically as the train’s wheels rotated. For tight bends, seen later in the journey, the entire train was rigged to bend sausage-style with mechanisms intact. Modelers also built a surreal deformation into the train using a lattice on the engine to increase its height progressively, creating the impression of an extreme wide-angle lens, as the locomotive towered over the boy.

Steam envelops the boy and, as it clears, reveals the conductor. Splat rendered dense volumetric effects and proved a vast improvement over earlier ray-traced renders. “Our initial concept tests for smoke elements took 16 to 20 hours per frame to create,” recalled Jerome Chen. “With Splat, we would render a frame in seconds, take a look at it, make the smoke look



The train pulls in to Santa Square in North Pole City, where an army of elves has gathered around the world’s tallest Christmas tree to celebrate the first gift of the season. The production conceived the city in a radial urban plan, with vast toy factories encircling the plaza and elf housing on the perimeter. Imageworks created Santa Square using painted textures projected onto 3D geometry, backed by digital matte painting extensions. Animators populated the square with 150,000 elves, animated through combinations of keyframe animation, performance capture and procedural flocking.

faster or slower, and very quickly turn around a shot. More iterations meant we could make the effects look so much better.” Effects animators used Splat to create steam issuing from pistons and smoke pouring from the stack, rendering up to 15 layers for depth and transparency.

Once on board the train, the boy meets a carriage full of children, built from combinations of real-life body scans and modeled heads. Gentle Giant scanned 24 children as Polar Express passengers. Imageworks categorized characters into six body types, and modeled 24 heads utilizing Cyberware data and photographic reference of the children’s faces. Interchangeable hairstyles enabled modelers to create additional versions for background characters.

Complexities multiply as a procession of chefs and waiters bound into the carriage, distributing cups of hot chocolate. The scene was one of several musical numbers in the movie that Broadway choreographer John Carrafa orchestrated during motion capture. Dancers enacted trampoline leaps, somersaults, cartwheels and Michael Jackson’s ‘moonwalk’ maneuver, performing to playback of Alan Silvestri’s score.



Lost among the toy factories, the hero boy and his new friends stumble upon Santa’s surveillance room – a huge hall filled with banks of television monitors, an enormous globe and a team of vigilant elves charting children who have been ‘naughty’ and those who have been ‘nice.’ Production designers Rick Carter and Doug Chiang provided Imageworks with architectural reference and AutoCAD renderings of the hall. Imageworks generated the environment by first evaluating 3D detail required to plot virtual camera moves in *Wheels*, then later fleshed out the setting using combinations of 3D modeling and 2D matte painting.

The Imagemotion shoot included a mockup of the hot chocolate dispenser cart and performers sipping from oversized wire-frame cocoa cups, amounting to more than 100 elements. Albert Hasting’s animation team integrated data into 20 passes, each lasting approximately 30 seconds. AnimatorsXS John Matthews and Ron Fisher led keyframe development of the dance, manipulating characters to avoid accidental collisions in the confines of the train car. One of the trickiest effects in the sequence involved jets of steaming cocoa flying from the hot chocolate dispenser and landing magically in cups. “Flying chocolate tended to look like flying intestines,” observed Alberto Menache. “It took a lot of look development to get it to the point where it looked like something you’d want to drink!”

To finesse flying cocoa, effects animator Matt Cordner developed an analytical animation system, allowing animators to dial in gravity and forces. “We assigned an emitter and a target,” said Daniel Kramer. “The system drew a line between the two, based on physical dynamics; but we could look ahead, so if the cup moved while the chocolate was firing, it calculated its trajectory to coincide with the final position at the time it hit, and it would land without spilling a drop.”

The train transports the children out of town through a moonlit forest, where wolves prowl the trees. Imageworks modeled a library of pines and aspens and filled the forest by selectively placing trees into the 3D environment. “For anything within 100 feet of the train we used

full-3D trees,” related Jerome Chen. “Past that, we used a series of procedural cards texture-mapped with trees that we rotated to camera. We then laid fog and snow over everything.”

Wolves — and all other animal characters in the film — were modeled from art department concepts and photographic reference, rigged with muscle, skin and fur simulations, and keyframe animated. “Bob wanted to emulate the painting of the wolves in the book,” noted David Shaub. “There was no way we could have motion captured dogs to perform those poses to the timings he required.”

In a sequence known as the ‘ticket ride,’ a train ticket belonging to one of the children blows away and takes a circuitous journey through the woodland environment. The sequence was one of the longest in production, subjected to much iteration as it developed over a period of 18 months. “At one point, we had the ticket passing a pack of bears doing a strange, sexy, hip-hop dance in the snow,” recalled Ken Ralston. “Then, as the camera pulled back we were going to see the Pope squatting in the woods, like the old joke, with a roll of toilet paper on his staff. We went down some weird roads!” In its final two-minute form, the sequence — guided by digital effects supervisor Mark Lambert — features 22 wolves, an eagle and her eaglet, and seven subset environments including cliffs, a waterfall and a giant rolling snowball.

The hero boy attempts to reunite the lost ticket with its owner and, in the process, clammers across the roof of the speeding train where he encounters another Hanks and Zemeckis creation — the hobo. For Hanks’ hobo scan, makeup artist Daniel Striepeke applied prosthetics supplied by WM Creations, accentuating the jaw and indicating a broken nose. Vladimir Todorov refined the look, and modelers tweaked prosthetics based on the designs. “We dialed back the prosthetic and roughed him up,” said Sean Phillips. “We also made him thinner in the face.”

A campfire reveals the hobo through the snow, illuminating the character as a sinister and otherworldly apparition. Doug Chiang’s group set the mood in conceptual designs; then lighting supervisor R. Stirling Duguid used combinations of 3D matting and 2D composites to materialize the hobo from the snow — rendering characters in RenderMan, generating a fog of snow in Splat, then fading off densities of snowflakes to create the effect of the hobo materializing from the firelight.

As the encounter unfolds, the hobo steps into makeshift skis and entices the boy to climb onto his shoulders. With Hanks playing both characters, motion capture for the scene required an ingenious special effects rig — known as ‘robohobo’ — built by Michael Lantieri’s team. “Robohobo was a motion control platform with a big wireframe version of Tom Hanks’ upper



Back in Santa Square, reunited with the conductor, the hero boy meets Santa Claus in the shadow of a mountainous sack stuffed with Christmas gifts. Imageworks generated boy, conductor and Santa using performance capture of Tom Hanks in all three roles, the performer wearing a weighted prosthetic belly and motorcycle boots when playing Santa on the Imagemotion stage. Santa’s beard required hand grooming from shot to shot. To enhance Santa’s beatific presence, Imageworks lit the character with a subtle internal glow.

half,” stated Demian Gordon. “We first captured Tom giving a piggyback ride to a stand-in boy who was on wires for safety. Stunt performers acted out the scene for wide shots. Tom then climbed up onto the robobobo, acting as the boy, and gave himself a piggyback ride as they skied down the top of the train.”

Animators used approximately 30 percent of the performance data for the stunt, and keyframed the remainder. “Bob wanted to motion capture everything,” said Ralston. “Even if we ultimately didn’t use the motion capture, he at least wanted to try to shoot actors or stunt people in a rig so animators had reference to block scenes and then amp up the performance.”

The sequence introduced Smokey and Steamer, a pair of comically mismatched engineers in charge of the train’s trajectory. The characters were initially played by and modeled on the late Michael Jeter, using cyberscans of the performer in prosthetics applied by Matthew Mungle. Michael Jeter’s death partway through production required Imageworks to rethink its approach. “When Michael Jeter passed away, we had only captured half of the scenes we wanted with him,” recalled David Shaub. “When we developed some keyframe tests and showed them to Bob, he decided that he wanted to pursue an entirely keyframe approach. The scenes involved a lot of broad slapstick humor, and he wanted to make them very ‘toony,’ exaggerating action, but with gravity — unlike Roger Rabbit — so they still fit in the physical world.” Shaub sketched out the Smokey and Steamer scenes in storyboards, then refined poses on animation paper before progressing to digital animation. The characters were first scheduled to appear in a musical number eventually cut from the film, but the scene defined the characters’ over-the-top style.

Smokey and Steamer were instead introduced changing a burnt-out headlamp on the front of the locomotive, perched above the cowcatcher with the train in motion, until it comes to rest, nose-to-nose with a herd of stately caribou. Caribou were keyframed with dynamic muscle, skin and fur simulations; and effects animation highlighted the animal’s breath in the headlamp of the train. The herd is revealed in its immensity, blocking the train’s path — 28 foreground caribou animated as hero characters, surrounded by 100,000 others, animated by a flocking system that sampled keyframe walk cycles and behavior. “We came up with a foggy, moody lighting rig as a classic cheat,” Mark Lambert elaborated. “We faded off the caribou in the distance, implying that there were even more out there than were visible; and then we had them move away from the train track, parting like the Red Sea.”



Santa takes flight in his sleigh, cracking a magical glowing whip above the heads of eight energetic reindeer. Imageworks adapted its caribou model to generate the reindeer, whose looks were based on conceptual art and photography of white-tailed deer. Animators developed bounding reindeer flight cycles that depicted the animals’ muscular gait, their hooves leaping and catching in air as if swimming through a viscous fluid. Effects animators then added fireworks and glowing contrails spraying over Santa Square, spilling off Santa’s whip, which was animated using Imageworks’ strand system.

The train next enters Glacier Gulch, scaling a 179-degree grade and then plummeting on a rollercoaster ride inspired by a single phrase in Van Allsburg's book. Zemeckis installed a team of Imageworks animators at his Northern California editing facility to develop previsualizations for the scene, then integrated animation with Wheels camera simulations. Imageworks refined animation and developed 3D and matte-painted environments based on Chiang conceptual art. "It was over the top," commented Jerome Chen. "We wanted to create fun, fantastic environments to pass through, where every summit led to an even bigger hill. We created a trellis that went 5,000-feet into the air and then dove straight down. All the train animation was keyframe — no simulations. The creative goal was to move the train as realistically as possible; otherwise it would take the audience out of the physicality of the film."

The wild ride deposits the train on a frozen lake, which cracks as the train fishtails across the ice. Effects animation lead Matthew Hausman used public domain shatter simulation software to fragment the lake surface. "That gave us simple, four-sided shapes," said Daniel Kramer. "We noised them up to make interesting little puzzle pieces, then we drew out the train's path and added procedural triggers, animated in Houdini. We then decided where chunks of ice should flip; so, when the train passed by, shattering effects radiated out." Imageworks modeled an underlying water surface so ice chunks could bob as they broke free, and rendered splashes using myriad RI points — RenderMan dot primitives — animated to explode up through the ice as the weight of the train displaced the lake. "We glommed millions of RI points together and rendered them with Deep Shadow, which gave us nice depth and made interesting splashes. It added a lot of power to the scene."



On Christmas morning, safely back home, the hero boy opens gifts with his sister. The scene blended two images from Van Allsburg's book in a slowly tracking, two-minute shot that ends with a closeup of the contents of the box — a gift from 'Mr. C.' The scene required a specific lighting palette to emphasize contrast and depth, emulating the warmth of Van Allsburg's illustration. For the final closeup, framed tight on a silver reindeer bell, Imageworks mixed in a subliminal glimmer of Santa's face reflected in the surface of the metal, denoting the hero boy's renewed faith in Santa Claus.

The train arrives at North Pole City, where the hero boy and his companions become lost. Doug Chiang's team designed the city in a circular radiating pattern, with the tallest Christmas tree in the world surrounded by toy-making factories and satellites of elf-style urban sprawl. City structures were elf-scale — so children appeared as giants — and were laid out in conceptual paintings and 3D models, in some cases embellished with detail using AutoCAD renderings. Imageworks generated a particularly epic interior seen as the children venture into Santa's surveillance room — a deserted hall filled with television monitors and a giant globe charting children that have been 'naughty' and 'nice.' "The surveillance room was based on the old Pullman train factory on the south side of Chicago," commented Sean Phillips. "We had very detailed blueprints, right down to details of the crown molding, and we probably built more than we really needed. It was very challenging because we sometimes built environments for

Wheels way in advance and had to guess what we might need before the story had been fully fleshed out.”

A pneumatic tube car rockets the children through the toy factory. Performers enacted the ride on the Imagemotion stage seated on a motion controlled bench built by Michael Lanteri’s team, which pitched them from side to side. Imageworks then created g-force effects on characters’ faces by stretching cheek geometry. Views of the factory streaming past the tube car windows were created using six digital environments, beginning with geometry giving way to abstract painted shapes and lighting effects.

The children land in the wrapping hall, a cavernous chamber of conveyor belts and rolls of colored paper. Imageworks modeled the room — complete with workbenches and wrapping paper littering the floor — entirely in 3D to handle parallax effects of camera moves, then flipped and repeated the background to quadruple the chamber’s size.

The wrapping hall leads the children into a system of metal shoots and a giant funnel. Performers were motion captured swaying in place on a curved section of set on a hydraulically controlled Lantieri rig. The funnel deposits the children on top of a mountain of Christmas presents, which shifts beneath them. To create the pile of gifts, Imageworks generated 24 types of wrapping paper, ribbons and bows, and then procedurally distributed gifts through the 800-foot-high pile.

Additional elf transport devices eventually deposit the children in a sea of red-suited elves crowded around the Christmas tree in Santa Square. Ivo Horvat’s team generated Santa Square utilizing textures projected onto simple geometry, backed by digital matte painting extensions. “Santa Square was immense,” observed Sean Phillips, “but the action only focused on one building, where Santa emerged, so we adjusted detail in the buildings and ended up using mostly painted textures.”

Some 150,000 diminutive elves surround the Christmas tree in a sea of red — animated using a complex blend of motion capture, procedural flocking systems and keyframe animation. “Bob didn’t want the elves to walk from ‘A’ to ‘B’ — ever,” commented David Shaub. “They bound, they tumble, jump, leap and scramble over the top of one another. So we animated elf behavior cycles, then refined their motion, using motion capture as a foundation.”

To provide an exotic range of elf movement, Imageworks motion captured dancers and a troupe of small acrobats for two weeks on the Imagemotion stage. Animators sped up action, accentuated poses and developed an elf motion library in Maya, which effects animator David Davies then integrated into a crowd flocking system developed in Houdini. “We could plop down a bunch of points,” explained Daniel Kramer. “The points then sampled animation clips and created goals, moving an elf along without colliding with any of his friends or running into walls. While we were animating, we represented each elf by a dot, dialing in all its attributes, then we tied that into RenderMan. At render time, the plug-in launched a scripted Houdini session with a dynamic shared object for every character in a little bounding box; and whenever RenderMan encountered one of the bounding boxes, it requested that character from Houdini, speaking to Houdini through the plug-in.”

The flocking system procedurally generated four levels of detail, rendering characters closer to camera at higher resolution and, via Houdini, generating additional procedural effects, such as animation of floppy elf hats. The system was mostly rule-based — requiring predetermined animation cycles, rather than deriving behavior through artificial intelligence — and resulted in render times of 20 to 30 minutes per frame for shots encompassing 50,000 to 60,000 cavorting elves.

Elf excitement mounts when Santa's eight flying reindeer appear. Imageworks adapted their caribou model to the reindeer, based on conceptual art and photo reference of a white-tailed deer. Animator Renato Dos Anjos developed three types of reindeer behavior. "We started with the reindeer cruise cycle," said David Shaub, "animating them to pull the sleigh in one fluid motion. We then animated them making the transition to the sky." Led out by elves, the reindeer display their urge to fly, thrusting skyward, but not yet making the transition to full flight. "To create a sense of these muscle-bound creatures pushing to get airborne, we decided the reindeer should look like they were trying to swim through a viscous material, each one lunging forward with its own unique style. And then, to top it all, we added elves trying to hold them back. We kept adding elves until we created this huge dangling mass trailing to the ground. Animator Roger Visard went into a transcendental state and keyframed all those elves in two weeks."

At the climax of the pageant, Santa Claus appears. Imageworks modeled Santa from scans of Hanks in classic red and ermine garb and fat suit, with facial prosthetics applied by Dan Striepeke. The prosthetic belly also aided Hanks in his performance capture. For a scene requiring the boy to climb up onto Santa's lap, Hanks made use of a variation of Michael Lantieri's robohobo rig — redubbed 'robo-Santa' — climbing onto the rig on the Imagemotion stage.

The most challenging aspect of the digital Santa character was his flowing beard. "We researched every Santa movie ever made," recalled Jerome Chen, "and we discovered Santa's beard always looked ridiculous. In *Miracle on 34th Street*, the beard was very short, and it never moved when he talked. In other cases, beards jiggled all over the place when an actor talked." To chaperone Santa's whiskers, Imageworks assigned two beard-grooming artists in the hair simulation team. "All they did was make sure Santa's beard moved in a natural way. We found this was a completely subjective decision. In shots when he smiled, we decided to have the beard wiggle a little less. In others, we decided to reduce wiggle entirely, locking the beard to the face. It came down to an artistic judgment on every shot."

To enhance Santa's beatific presence, Imageworks added a subtle digital effect to the character's lighting scheme. "When we first started rendering shots with Santa," explained Chen, "he didn't feel significant enough. He had the same naturalistic feel as all the other characters. We decided to give him a glow, adding diffusion so his beard appeared to radiate, making him look like he had a light inside. It helped depict him as a deity — he ruled the North Pole, and the elves were all his supplicants."

Revelry reaches fever pitch as the elves send Santa on his way, letting rip with an elf rock number, performed on the Imagemotion stage by Aerosmith front man Steven Tyler. "I'm a big

Aerosmith fan,” admitted David Shaub, “so it was really fun to record Steven doing his Steven Tyler thing — jumping around, falling on the ground. We put Steven on top of an eight-foot unicycle, then Bob did his Wheels routine to put him in this scene. We animated the entire song, from beginning to end, using motion capture of swing dancers for the dancing elves. It was trimmed down to one shot that pulls back from Steven Tyler — but you can tell it’s definitely him.”

Fireworks and glowing contrails of animated pixie dust accompany the dance and the flight of Santa’s sleigh as it leaves the North Pole. Imageworks generated fireworks and other aerial effects using a RenderMan ‘strand system.’ Originally developed by effects animator David Stephens to represent ghostly apparitions for *The Haunted Mansion*, the system allowed animators to assign patterns of points and then procedurally disburse millions of RenderMan primitives at render time, festooning the animated path with wispy, gaseous tendrils.

After Santa’s departure, *The Polar Express* takes its passengers back home, ending the enchanted evening and bringing with it the film’s first glimpse of daylight on Christmas morning, requiring a new color and lighting palette. “We tried a lot of warm and bounce light to make it feel like early morning,” recalled Rob Bredow. “We did some beautiful lighting passes, but Bob wanted more contrast to create a feeling of depth.” In the final weeks of production, Ken Ralston collaborated with a digital colorist to hand-paint frames. “It diverged from what we’d tried before, but it had nice contrast and depth that pointed us in the right direction. It very closely resembled the illustrations in the book with warm lighting on the characters, but more muted colors in the background and dappled lighting for effect.”

The final shot combined the last two paintings from the book in a 2,700-frame shot that ended on a closeup of a reindeer bell, a gift from the North Pole, set on a table. Imageworks mixed in a subliminal glimmer of Santa Claus’ face reflected in the surface of the metal as the shot closes out the film — a subtle detail reinforcing the hero boy’s belief in Santa.

The simultaneous worldwide theatrical release and Imax 3D presentation of *Polar Express* elevated the film to the scale of an event that, for many, heralded a new form of animated film. “It is a new genre,” declared Jerome Chen, “and, as a genre, it won’t be appropriate for every kind of movie. I don’t think we’ll be seeing performance capture used for remaking *My Dinner With Andre*. But I’m hoping that it opens up other types of movies, giving filmmakers a new avenue to explore.”

Viewed in the context of Ralston’s and Zemeckis’ creative collaboration — spanning close to 20 years of visual effects filmmaking — the new genre still demanded a balance of craft and artistic achievement. “I always approach effects from an artistic standpoint first,” stated Ralston. “Technology is the nightmare that follows. It was great having the control that we had over this world. Bob’s vision was less contaminated by compromise than it has been in any other film. It really did become what he set out to create — a moving art piece. For a director with a very precise, specific vision, it’s possible to achieve that vision in this world.”

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A Series of Persnickety Effects

ARTICLE BY JODY DUNCAN

In the opening moments of Lemony Snicket's *A Series of Unfortunate Events*, the unseen narrator warns audience members that what they are about to see is not a typical happy children's story, but rather a grim tale of the orphaned Baudelaire children — teenagers Violet and Klaus, and toddler Sunny — who suffer a series of most terrible and unfortunate events as they are passed from guardian to guardian after the tragic and untimely death by fire of their wealthy and loving parents.

Screenwriter Robert Gordon translated the first  three volumes of Daniel Handler's popular children's book series — supposedly penned by the fictional 'Lemony Snicket' — into a screenplay for the Paramount Pictures and DreamWorks production, which was filmed almost entirely on stages at Paramount and at the former Lockheed facility in Downey. The completed movie featured 505 effects shots created by Industrial Light & Magic, with visual effects supervisor Stefen Fangmeier helming the project.

Months prior to the start of principal photography, director Brad Silberling went to ILM with one overriding concern: the feasibility of creating the baby Sunny as a 3D-animated character for scenes in which the child would perform stunts and behaviors that no real child actor could manage. At this early stage, Silberling even toyed with the idea of doing all of the Sunny shots digitally. "If we'd done it entirely with a CG character," said Stefen Fangmeier, "we would have never had to intercut with a real baby, and that would have been an advantage. But, on the other hand, we wouldn't have had reference of a real baby to guide us. It was a tradeoff; and, ultimately, we decided to go with intercutting back-to-back with a real baby."

ILM began developing a test shot of a digital baby, using Silberling's two-year-old daughter, Charlotte, as the test subject. Among the advancements needed to create a photorealistic baby were more sophisticated rendering tools — specifically, improved ray-tracing, subsurface scattering and global illumination techniques that would simulate the smooth, translucent quality of baby skin as it would look in the lighting scheme Silberling intended to employ on his stage sets. "They were planning to use big light sources," explained research and development lead engineer Christophe Hery, who spearheaded the effort to refine ILM's rendering tools, "which would produce very diffuse and soft light. We had to be able to simulate that look in the lighting on the baby."

As the R&D team addressed rendering issues for the test, animation supervisor Colin Brady explored animation techniques. "Doing a fully CG baby was about as scary as it gets," said Brady. "Baby motion is very specific. They have a kind of wobbly motion that people recognize, and the physics of how big their heads are compared to their bodies also comes into play. Not

only is the motion very specific, they have to look cute and appealing. And having to match this baby to a particular baby in the film, cutting back to back, made it even more challenging.”

ILM initiated test animation by conducting a series of motion capture sessions with performers ranging from an eight-month-old baby, to Brady’s three-year-old daughter, to a five-year-old, to an adult acting out the parts of the baby. The motion capture data was then applied to a digital model of Charlotte Silberling. “It was a pretty successful test,” Brady stated. “It still wasn’t all the way there, but we could see where we were and where there were still flaws.”

Reassured by the test, Silberling and his crew launched into principal photography. With production designer Rick Heinrichs and director of photography Emmanuel Lubezki, Silberling fashioned a hyper-theatrical look for the film, surrounding stylized stage sets with painted, almost impressionistic backdrops, and shooting most of it locked-off, with wide lenses.

Sunny’s scenes were slated early in the shoot, with a set of triplets initially portraying the character. When the temperaments of the triplets proved ill-suited to filming, they were replaced with 18-month-old twins Kara and Shelby Hoffman. “The twins worked out very well,” recalled ILM visual effects producer Jeff Olson. “They were amazingly cooperative and happy, and they didn’t freak out and cry during the shoot.” The twins were such good performers, in fact, Silberling began to realize they would be able to perform gags he had previously scheduled for the digital Sunny. As a result, the original slate of 75 to 100 digital Sunny shots was reduced to only 25. “These girls just did a phenomenal job, and that lightened our digital Sunny workload. Also, at the beginning, Brad had written more dialogue and more specific actions for Sunny to do; but in the course of the shoot, he realized they could get away with a little less of Sunny. So her part became smaller than it was originally conceived, and that meant fewer shots for us.”

“Fewer shots was fine with me,” added Stefen Fangmeier, “because it was going to be such a challenge to make each digital Sunny shot work. I preferred to do fewer of those moments, and do them really well.”

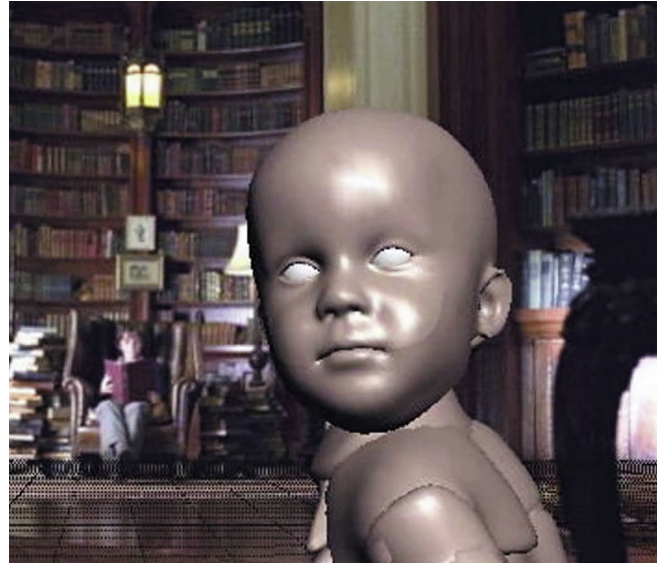
On the set, crews shot reference plates with the real baby for all of the digital Sunny scenes, providing real-world grounding for lighting and animation. “We always had the little girls for reference,” Fangmeier said. “Even if the action was something that the real baby couldn’t possibly do, I wanted her there, in the lighting, so that we could see all the details of the skin and eyes and hair. It was difficult on production, especially since the babies could only work for short periods of time. I’m sure they were thinking, ‘This is going to be an effects shot anyway — why do we have to go to the effort of bringing in the baby?’ But having that reference was essential for us. We always shot a clean plate, as well, so we wouldn’t have to take the real baby out of shots.”



The dark humor in author Daniel Handler's series of children's books translated to the motion picture screen in Lemony Snicket's *A Series of Unfortunate Events*, a Warner Brothers and DreamWorks co-Production, directed by Brad Silberling. The film tells the story of the Baudelaire children, who are orphaned when their parents perish in a mysterious house fire. Industrial Light & Magic supplied 505 shots to the show, including a wide view of the flame-ravaged Baudelaire Mansion – a composite of live footage and a digital matte painting constructed from photos of a scaled mansion model. ILM also augmented real emergency vehicles shot on a street set with digital fire trucks.



With their parents' untimely demise, the Baudelaire orphans – Violet, Klaus and baby Sunny – are delivered into the hands of their new guardian, Count Olaf, an actor of questionable talent and motives, played by Jim Carrey. The scheming Count, out to rob the children of their inheritance, dons a series of disguises in the course of the picture. All of the makeups were designed and implemented by makeup supervisor Bill Corso, who had previously worked with Carrey on *The Majestic* and *Bruce Almighty*.



ILM created a CG Sunny for gags – such as catching a spindle in her mouth – that live babies could not be expected to perform. In lieu of scanning, ILM upgraded its image-based modeling system to build the digital Sunny model, photographing the twin babies cast in the part with an array of high-resolution digital video cameras, capturing geometry and textures simultaneously. From the digital footage, modelers built a library of facial expressions in motion. For final body animation, ILM motion captured toddlers performing specific actions, then employed XSI software to edit and massage the data. ILM refined its rendering tools, which included improved subsurface scattering and hair shaders, to impart a photoreal look to the digital baby.



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In addition to capturing reference footage in all the stage setups, ILM conducted an extensive digital video shoot with the twins on a nearby stage, gathering images that would serve as the basis for the digital Sunny model, in lieu of scanning. “We couldn’t scan the babies for our

model,” explained Fangmeier, “because they wouldn’t be able to sit still for the 20 seconds, or whatever it takes, to do the scan. So, instead, we defined the surface features of the baby by upgrading ILM’s proprietary image-based modeling system to capture geometry and texture data together instantaneously. R&D engineers Colin Davidson, Max Chen and Francesco Callari improved the solvers and tools to reconstruct precise surfaces from multiple photographs. It was great because we could also get expressions, which you don’t necessarily get with typical scanning. We could have her smile, for example, capture that moment, and get a very accurate representation of that in the digital model.”

The effects team had initially considered doing facial capture as a means of capturing expressions, a technique that would have involved placing hundreds of reflective dots on the babies’ faces, capturing the data, and remapping it onto the digital model. Ultimately, the technique was rejected, not only because it was still in the research and development phase, but also because the babies were not as ‘directable’ as grown actors, which would have led to very long and often unproductive facial capture sessions. “Babies just kind of do what they do,” said Colin Brady, “and so you would have to capture hours and hours of facial performance to get everything you needed. So, instead, we developed this ‘poor man’s facial capture’ technique, lining up six high-resolution digital video cameras on the babies’ faces and shooting hours of them sitting there making different expressions, biting things, talking, crying. Through that, we were able to build a library of expressions that we could use in any of the shots.”

ILM stabilized the footage — essentially locking the baby’s face center screen — then gave it to digital modeler Martin Murphy. “Martin was really Most Valuable Player on the show,” commented Brady. “He went through, frame by frame, and re-created these facial expressions in motion. Instead of creating generic expressions for one still frame, he delivered to us three to five seconds of continuous motion that followed the video footage exactly. These chunks of expressions in motion — the baby puckering its mouth, crying, smiling — became libraries that our animators could use as they animated the baby. They were done as Caricature files, so they were in a form the animators could understand. It enabled them to tweak things and edit things — hold a smile longer or take out a blink or whatever.”

Armed with the production footage and all of the research and development that had been implemented during the test phase, ILM jumped into its work on final Sunny shots. For final body animation, the crew went back to the motion capture stage to record specific actions required in the now cut live-action scenes. “I feel as if I’ve worked with the best animators in the world at Pixar and here at ILM,” said Brady, “but I don’t think any animator would be up to animating a baby from scratch and making it convincing. So we motion captured my daughter again, and the daughter of another TD here. It wasn’t practical to motion capture the twins, mainly because we were doing our motion capture up here while they were still shooting down in Los Angeles. But we felt that generic baby motion capture would work, as long as we could tweak it afterwards.” To enable extensive tweaking, the animators used XSI software, which has excellent user-friendly motion capture editing tools. “You can cut-and-paste chunks of motion capture and blend them from one to another, and really massage it. Since we were dealing with young children, and we couldn’t get exactly the actions we needed in one long take, we just had

to capture quantity, then create the appropriate action by taking one piece from one thing and another piece from something else and mixing them together.”

Rendering of the final Sunny shots took advantage of new technologies for lighting reference that ILM had shot on the set. ILM matchmovers modeled the rooms and environments Sunny would be seen in, then digital artists applied texture maps derived from stereo photography to that geometry. “From the on-set data capture they were doing,” explained Christophe Hery, “the matchmovers were giving us the real placement of the lights. So we’d put these texture maps on the furniture or the walls, and we would be lighting the environment just as a DP would. The light would be absorbed by the walls or a piece of furniture and radiate back out a different color. And that colored light is what would reach the baby. We could put the character close to a wall, for example, and the wall would bleed color onto the subject — and vice versa. It gave the character a richness, interacting within its environment. It wasn’t 100 percent accurate, but it was a really good approximation — probably 95 percent there. And it was still manageable in terms of rendering speeds. All of this was possible because of advancements in RenderMan’s ray-tracing capabilities.”

The new approach was so much closer to lighting the way a real DP would, it required some retraining on the part of the technical directors. “The TDs have always had to cheat light,” said Hery, “because there were so many limitations in CG before. They always had to fake bounce light, for example. With this, we told them: ‘Don’t cheat anymore. Let the light bounce around and behave like it’s supposed to.’ At first, some of them still had a tendency to cheat it. They would set lights by hand to bounce around; but then the system would add bounce, and we’d wind up with too much. It took a bit of time to retrain everybody.”

Improved shaders created the fine hairs on Sunny’s head and the barely discernible peach fuzz on her face. “It was a matter of so much detail,” said CG supervisor Gerald Gutschmidt. “We had to create a very specific specular reaction on the hair to get its soft sheen; but, at the same time, individual hairs had very broken-up, pointy glints. Another issue was color variation. The hair may be brown, but there are hundreds of browns! And we found that if we didn’t get just the right color, the hair didn’t look realistic. The amount of clumping hair versus wispy hair was another crucial factor in getting the hair to look real — especially in silhouette. Also, the shadows — how soft should we go? It took a great deal of time to find exactly the right levels. We had to keep tweaking the material to get all of those details in it. We were fortunate in that



Bill Corso applies the Olaf makeup to Jim Carrey. Months prior to the start of principal photography, Corso designed a variety of Count Olaf concepts in Photoshop, then manufactured prosthetic pieces for a test. The final makeup – which took 90 minutes to apply – consisted of a large hooked nose, a prominent brow bone, a heavy ‘unibrow’, a goatee, and discolored dental veneers. Throughout production, Carrey had his head shaved each morning to aid in the fitting of a balding Count Olaf wig.

we had the time on this project to really make the hair perfect.” Technical director Jeff Hatchel took the lead in the hair look development.

By the time the project moved officially into postproduction, the CG Sunny shots were coming together and exceeding all expectations. “We were really ahead of the game at this point,” noted Stefen Fangmeier, “because of all the work we’d done in the test phase. As it turned out, the thing we’d thought would be the most difficult — the digital baby — actually went very smoothly. And the things we hadn’t thought too much about, such as 2D and 3D environments, became the bulk of our work on the show.”

Sunny and her siblings are first revealed on Briny Beach near the Baudelaire Mansion, where the youngsters contentedly wile away the hours prior to learning of their parents’ demise. In a series of flashbacks, the scene establishes Violet (Emily Browning) as the young and brilliant inventor, Klaus (Liam Aiken) as the bookworm, and Sunny as the ‘biter’ with sharp, serrated teeth. “That is where you find the most remarkable digital Sunny shots,” stated Jeff Olson. “They establish that she likes to bite things, and they show her biting a wooden spindle her brother throws for her — like a dog catching a Frisbee. We really establish her character in this scene.”

In the hero spindle-catching shot, Sunny jumps from right of frame, catches the object, then turns toward camera. “Her face is full-frame in the shot,” said Fangmeier, “so it didn’t matter how long it took to do it — that shot had to be absolutely perfect. It had to work.” To gather raw animation for the shot, ILM motion captured its real child performers jumping. “I told them to pretend that they were frogs jumping up to catch flies in their mouths,” Colin Brady recalled. “Once they got into that mindset, they were great. Of course, a real baby couldn’t catch that spindle in its mouth; but at least the action was physically based on real kids jumping. Because of that, you buy it as a real action.”

In another flashback shot, Sunny hangs from the edge of a dining table by her teeth. To capture the action, ILM built a bar on the motion capture stage, and had the child performers bite the bar as crew members held them up underneath their armpits. “It wasn’t as daunting as I thought it would be,” recalled Brady, “because that kind of biting came very naturally to the kids. As we held them up, we would swing them gently, which gave us some beautiful motion. Of course, in the motion capture data, you could tell that the baby was being lifted and helped a bit underneath her armpits; but we were able to tweak that and correct it through our great motion capture editing tools.”

After their parents' death, the children inspect the charred remains of their home, Baudelaire Mansion, views of which were realized with a combination of live-action footage shot on a full-size street set, location photography, and matte paintings derived from a miniature. "We received the footprint drawing of a real house in Boston that Brad had picked for the location shoot," said model shop supervisor Steve Gawley. "We took that footprint and the concept art that was given to us by Rick Heinrichs, and built a quick 1/24-scale foam model of the burned-out house that measured about six foot square and four feet tall." The model shop delivered the foam model to digital matte painter Paul Huston, who dressed it, then photographed it, using those images to construct a matte-painted view of the charred mansion. Huston also added fire trucks — augmenting the real emergency vehicles that had been shot on the street set — and smoke.

Compositing supervisor Marshall Krasser oversaw the assembly of the live-action and matte-painted elements. For the end of the aftermath sequence, Sabre artists took the running footage of the scene, froze it and turned it black-and-white. "The camera pulls back," stated Krasser, "and you realize that Lemony Snicket (the voice of Jude Law) is actually holding a photograph of the event, as if he is telling a story. It's a very nice transition."

The orphaned children are transported by car to the decrepit home of Count Olaf (Jim Carrey), a distant relative who schemes to rob them of their inheritance. Traveling car shots throughout the film were photographed on a bluescreen stage, with digital environments created by ILM art director Wilson Tang and artists Dan Slavin and Jeff Grebe providing the views outside the windows. "Wilson's team created some inexpensive 3D environments for us to travel through," said Jeff Olson, "which was a big innovation for us. These car shots serve as



To further his nefarious scheme, Olaf dons disguises as 'Captain Sham' – whom the children meet while in the company of their Aunt Josephine (Meryl Streep) – and 'Stephano', a herpetology research assistant. For Captain Sham, Corso exchanged the Olaf goatee with a graying beard, and the black unibrow with bushy gray eyebrows. On the set, Carrey wore a peg-leg appliance – his real leg bent behind him – which ILM finessed digitally in postproduction. After exploring a number of Stephano looks, Silberling and Corso opted to maintain the basic Olaf facial structure, altering his appearance by darkening the wig, styling it into a comb-over, shaving the eyebrows and adding a pencil-thin mustache.



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transitions from one scene to the next. There are 20 or 30 of them with the kids in the car, being taken to their next guardian and next ‘unfortunate event.’”

City views, as seen from the car windows on the drive to Count Olaf’s residence, suggested a period look. “The city looks a bit like Boston or 19th-century Paris,” said Wilson Tang, “but it was really different time periods all mixed together to create this fantasy world. We referred to a lot of paintings and photographs to create the look. On set there were paintings of the city on giant backdrops, and we took inspiration from those, as well. Rick Heinrichs also gave us a really good scrapbook that we used as a guide.” ILM added CG traffic in the traveling shots — particularly in the early part of the drive — to establish the illusion of a populated city street.

Count Olaf makes a dramatic entrance shortly after the children’s arrival. Makeup designer Bill Corso, who had worked with Jim Carrey on *The Majestic* and *Bruce Almighty*, worked with the actor to design a basic Olaf makeup that would serve as the foundation for two additional disguises the character would don in the course of the film. “All of these characters were vividly described in the books,” related Corso. “And in the books, his look changes drastically from one story to the next. The problem for us in doing three books in one film was that it wasn’t realistic to do such drastic changes in appearance. Count Olaf couldn’t have a shaved head in one scene, for example, and then his own hair grown back in the next scene. So we came at it as if he is a kind of Mr. Potato Head — a basic canvas on which we would build these other disguises. So, first, we had to create the look of Olaf as Olaf. Then we could create the look of that same guy in disguises.”

Corso began playing with looks on the computer to generate Olaf makeup designs. “Working in Photoshop,” Corso said, “I did every disguise in the book on Jim’s face. Jim is actually very computer-savvy, and it so happened that he was getting into Photoshop at the time. So the two of us spent a lot of time together at the computer, experimenting with looks.” Corso then took the best of the Photoshop designs and manufactured pieces to apply to Carrey for a test several months before the start of filming. “We sat Jim in front of a mirror, and I provided him with noses and chins and eyebrows and wigs and hairpieces. For two days we just stuck different

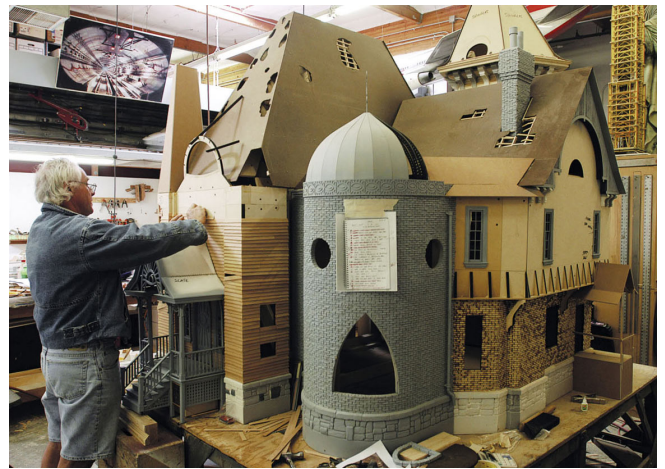
(Meryl Streep) – and ‘Stephano’, a herpetology research assistant. For Captain Sham, Corso exchanged the Olaf goatee with a graying beard, and the black unibrow with bushy gray eyebrows. On the set, Carrey wore a peg-leg appliance – his real leg bent behind him – which ILM finessed digitally in postproduction. After exploring a number of Stephano looks, Silberling and Corso opted to maintain the basic Olaf facial structure, altering his appearance by darkening the wig, styling it into a comb-over, shaving the eyebrows and adding a pencil-thin mustache.



The children arrive at Count Olaf’s ominous abode. Adhering to a stylistic decision to shoot most of the film on stage, production designer Rick Heinrichs built the house exterior set as high as stage dimensions would allow. ILM then completed the uppermost regions of the structure by tracking in photography elements of a scaled house miniature, constructed by the model crew. Ultimately, the house miniature was used for wide establishing shots, as well, due to the greater control over lighting that could be achieved on the model photography stage.

stuff on him. We finally came up with the definitive Count Olaf look, which was very menacing and creepy.”

The makeup featured a large hooked nose, a prominent brow bone, heavy eyebrows, a goatee, discolored teeth veneers, and a wig, which was applied over Carrey’s shaved head. Once Corso and Carrey got the hang of the routine, makeup application times came down to an hour and a half. “Jim would come in and get his head shaved, which took about 20 minutes. Then he’d come over to me for makeup, and that was about an hour and a half. The hardest part about it was blocking out his hair, covering the blue shadow from his shaved head. To paint that and not have it look like makeup took a long time. Then he would go back to hair, and his stylist, Ann Morgan, would pop the wig on. He also grew his nails so they looked kind of creepy; but they broke off, so we ended up popping on fake nails — constantly.”



Model builder Robbie Edwards constructs the 1/8-scale Olaf house. The model shop based the miniature on photographs from the set, architectural drawings, and painted pieces provided by art director John Dexter. Model shop crew members input the drawings into ILM’s computers, then built the house miniature from the CAD files, ensuring that every feature of the replica was precisely scaled to the full-size set.

Glaf's abode is as unappealing as the Count himself. Rick Heinrichs built the front and back exteriors of the house on stage at Paramount; but, due to insufficient vertical space, the set could be built only up to a height of 35 feet, leaving the uppermost 45 feet of the house to be created and tracked into the live-action by ILM. A 1/8-scale miniature provided the house extension, and also solved on-stage lighting problems. "The set was built all the way up to the lights on stage," explained Stefen Fangmeier, "and there wasn't enough distance between the set and the lights. As a result, the top of the set would be lit hotter than the bottom. Also, the stage lights could only approximate what a real sun and sky would do. There was still more key light than you would get outside. So we decided to use the miniature house for establishing shots and other purposes, because we could exercise a lot more control over the lighting on a miniature."

In addition to extending the top of the live-action set house and providing establishing views, the miniature gave Heinrichs a second shot at perfecting the look of the Count Olaf house. "Production art director John Dexter art-directed the miniature as we were building it," said Steve Gawley, "providing for an exact match. We also had extensive pictures from the set, 200 architectural drawings, and painted pieces provided by John Dexter." Lead modelmaker Bryan Dewe input the drawings into ILM's computers; then Gawley and Dewe, along with modelmakers Robbie Edwards, Tom Proost and Michael Lynch, built the house miniature from the CAD files. "That meant that our front door was exactly 1/8th the size of the big door. The overhang was exactly 1/8th the size of the full-scale set. All together, the house measured about nine feet square and nine feet tall. We nicknamed it the 'Home Depot' house, because it had every building material you could think of in it — shingles, slate, copper and brick, beautifully weathered and covered with vines by lead painter Peggy Hrastar, along with Randy Ottenberg and Victoria Lewis."



Materials used on the miniature included shingles, slate, copper and brick. Crew members weathered the model with washes of paint and covered it in scaled vines. Modelmaker Randy Ottenberg applies final set dressing to the miniature.

Life at Count Olaf's is not pleasant. The children work as slaves all day, and sleep in a cold, comfortless room at night. In mutiny, Sunny lashes out at the Count verbally, speaking a gibberish that is heard throughout the movie, translated for the audience in subtitles. The intensity of the argument required that the moment be played by the 3D animated Sunny. "Initially, we overplayed Sunny's encounter with Olaf," recalled Colin Brady. "All of a sudden, she became too intelligent and combative — an expert debater, instead of a baby. So we pulled that back, articulating the mouth less." For some shots, the team decided to replace only the bottom portion of the live baby's face, leaving her very expressive eyes intact. "The real baby's eyes were unfocused and looking around, and they looked more believable than anything we could animate. So there were several shots where we did 'muzzle replacements,' just replacing her cheeks, nose and mouth. We didn't want to just replace her mouth, because it had that cereal-commercial-talking-animal look. Replacing the entire muzzle seemed to be a good compromise." In some instances, animators tweaked the eye area of the real baby, manipulating the brows ever so slightly in 2D to give her a more angry expression. The blending of the digital muzzle to the live-action face was done in the compositing department, with 2D warping sometimes required to perfect the blend area.



Arranging for the children's untimely deaths, Count Olaf locks them inside a car parked on a railroad crossing. Live-action elements were shot on a forced-perspective stage set, which was extended digitally. ILM animated a CG train, using lattices to contort the locomotive and match it to the forced perspective of the set as it moved through frame. The same compression was applied to the CG particle smoke rising from the engine smokestack. Digital car windows and windshield, and atmospheric haze to heighten the forced-perspective illusion, were added in compositing.

Orchestrating an 'unfortunate event' for the children that will make him heir to their fortune, Count Olaf parks his car on the tracks at a railway crossing, locks the children inside, and walks away. Production shot the train sequence on a huge forced-perspective set consisting of tracks and some surrounding terrain. "It was a big circular set," said Fangmeier, "with full-size railroad tracks, a little convenience store that Olaf goes into, and a painted cyc all the way around it. As the train tracks and telephone poles extended out toward the painted backing, they got smaller and smaller to force the perspective. So if you walked along this track, you would suddenly look like a giant. It was beautifully done."

ILM took the live-action plates shot on the forced-perspective set and added a digital train, along with smoke and reflections in the car windows for a total of two dozen shots. "The most interesting challenge for us in this sequence was to put our CG train into that forced-perspective set," said Fangmeier. "We had to force the same perspective change onto our CG train, making those transitions, starting from the backing and all the way toward the camera. The problem is that forced-perspective sets are never entirely accurate, because they're done by eye, essentially. But in CG, we had to reverse-engineer that and figure out a numerical approach."

The digital train was put through a kind of virtual ‘squeeze box’ to distort it and match the forced perspective of the live set. “Creature developer Andrew Anderson came up with a combination of a wire deformer and two lattices,” Gerald Gutschmidt explained, “one for the individual cars and one global lattice on top of that. The wire deformer was there to follow the track, and the lattices were there so we could dial in the forced perspective of the individual cars. The global lattice allowed us to override what we had done on the individual cars, if the effect wasn’t quite right.”

The same compression had to be done on the particle smoke coming out of the engine smokestack. “We had special rules to force the perspective of the smoke,” Gutschmidt commented. “The smoke was a simulation done in Maya; and then we did volumetric rendering of the particles. We also had a custom RenderMan shader that we wrote, made up of several layers — a core and wispy layers that broke up and dissolved into the background sky.”

Atmospheric haze added in the compositing stage further heightened the forced-perspective set illusion. Compositors also added digital car windows and windshield — a post chore made necessary by on-set reflections of silks that had been hung over the stage lights. “Several compositors and I did some testing to see if we could lessen the reflections of the silks on the windows,” recalled Marshall Krasser. “But, after testing for a bit, we realized we were going to have a problem. So they pulled out the windows and windshields of the cars, and we had to put those in digitally. In some of the shots, it’s really just a hint of a windshield, because Brad didn’t want to obscure the characters inside the car. So we purposely kept it a bit clear.” Pat Brennan served as compositing sequence supervisor for the scene.

ILM’s art department extended the train crossroads set digitally. All of ILM’s 2D and 3D environments for the show had to look appropriately realistic, while also matching the theatrical style of the painted backdrops used on stage. “They had half a million square feet of backing painted for all of the sets,” said Jeff Olson. “While that worked for a lot of shots, often we had to extend it. We had to find the balance between a backing that was very stylized and a more photoreal look. It was very challenging, artistically.”



The clever children escape the train collision and are delivered to the home of herpetologist Uncle Monty. Though the Uncle Monty house set was filled with real snakes and lizards, ILM animated the harmless and inappropriately named ‘Incredibly Deadly Viper,’ which figures prominently in the story. For a scene in which Sunny playfully wrestles with the serpent, the crew shot one of the twins on set, wrapped in a rubber snake, to capture lighting reference, then added the CG baby to a second, clean plate. In shots featuring the real baby, ILM’s rotoscoping crew reconstructed plates, removing the rubber snake to make way for the 3D-animated version.

“We knew it would be jarring to go from these very stylized backdrops to our 3D environments if we went for a normal photoreal look,” added Wilson Tang. “The contrast would be apparent to the viewer. So our goal was to create very painterly, impressionistic environments.” ILM took digital photographs of the painted stage backings, and used those stills as starting points for their matte-painted backgrounds. “When it was necessary, we could use those to blend the starting point of our matte paintings with the end point of their painted backings.”

Using one of Violet’s brilliant and hastily assembled inventions, the children manage to escape a train collision, and are next transported to the home of Uncle Monty (Billy Connolly), which sits in a marshy area on ‘Lousy Lane.’ Lousy Lane exteriors were created digitally, inspired by photographs Tang and other members of the crew took in a marshy area north of San Francisco. The exterior environment was created in 3D, from scratch, and was used in 10 shots of the car driving through the marshlands. Locked-off establishing shots of Uncle Monty’s house were created with 2D matte paintings.

Uncle Monty is a kind but eccentric herpetologist with a house full of snakes and lizards — most of which were real, shot live on the set. Exceptions included a two-headed cobra and the ‘Incredibly Deadly Viper,’ both of which ILM created through computer animation. “The whole Uncle Monty set was filled with real snakes and huge lizards,” recalled Stefen Fangmeier, “so we had a lot of reference of real snakes to work from.” An animatronic viper built by the production prop department provided some additional reference for the 3D team. “The animatronic was about two-thirds of the snake, from the head back, operated by four puppeteers. We also had a rubber dummy one that we could use for posing. But, essentially, they were just place-holders, and none of the animatronic work remained in the movie. Snake movement is very hard to animate, and even harder to mechanize in an animatronic. In fact, we had more trouble getting that snake animation right than we had doing Sunny. When you really look at what is going on in a snake’s movement, it is really tricky.”

“Snakes are surprisingly difficult,” Colin Brady agreed. “They’re among the most deceiving models to build in the computer because they’re not just big tubes. Snakes never have consistent centers of their bodies, and their heads tend to be somewhat gyroscopic. So we had to give the snake multiple centers; and when we were animating it, we had to constantly switch from one center point to another.” Kagi Yamaguchi modeled the viper, then rigged it for animation in a way that would facilitate multiple-center movement. “He came up with a multiple hierarchy idea, and he was able to modify the rig for every shot — which was great, because every shot had its own problems. We never really came up with the ideal rig that worked for all



After the death of Uncle Monty, the children are transported to Aunt Josephine’s house, which clings precariously to the side of a cliff overlooking a lake. Production built a huge water tank specifically for the lakeside sequence, erecting a partial house-and-cliff setting and surrounding it with a painted backdrop. ILM extended the set for wide shots, using miniatures as the basis for a digital house and cliff, and replaced the backdrop with a matte-painted view.

scenes. Usually, I would just call up Kagi, tell him what we needed for a shot, and by that afternoon he would have created a custom rig.”

For a pivotal sequence in which the digital Sunny wrestles with the viper, the actions of the baby had to be determined before the snake animation could be nailed down. For reference purposes, the production crew shot one of the twins on the set, wrapped gently in the prop snake. “That was valuable just to get the true lighting cues,” commented Brady. “We wrapped the giant rubber snake around her, and did a few shots like that. Then we took her out, shot a clean plate, and added our CG baby to that.” Animation of the CG baby evolved from broad actions to more gentle playing. “Once we decided what human performance worked the best, we were able to nail down the snake performance and get it to interact with that human performance.”

The animation of the snake in the scene needed to look believable, but not so horrific that it would appear as if the baby was in real danger. “The gag is that people assume this baby is being attacked by the viper,” said Brady, “but, actually, she is just playing with it. The viper, as it turns out, is not deadly at all. It is like a big, playful puppy dog. At first we played it that way — like a big, playful puppy — but that looked way too cartoony. So we found reference of giant snakes attacking things, and we moved the viper much more in that direction.”

ILM’s roto department was responsible for plate reconstruction, removing the prop snake from the takes Silberling wanted to use for the final shots. “This snake was going over the kid’s face in a lot of shots,” said Marshall Krasser, “so there was a lot of roto involved. It was incredibly hard to do, but most people won’t even think about it.”

Uncle Monty and the children are about to ship off on a science expedition to Peru when a replacement research assistant, Stephano — actually, Count Olaf in disguise — appears on the



Modelmaker Tom Proost adds finishing touches to the Aunt Josephine house miniature. The model shop carefully measured a 1/48-scale maquette provided by the production art department, then input those measurements into the computer, and laser-cut components. The final miniature was fabricated at 1/8 scale, out of redwood.



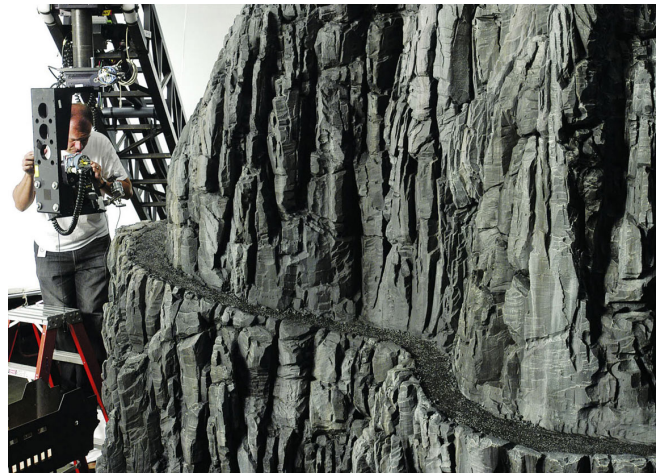
Model shop supervisor Steve Gawley attends to a section of the house miniature on stage. For some scenes requiring digital imagery, crews shot stills of the miniature, which were then photo-mapped onto CG geometry of the structure.

scene. For the Stephano makeup, Bill Corso originally took his lead from Daniel Handler's book, which described the character as a bald man with no eyebrows and a fake beard. "I did Photoshop illustrations of that idea on Jim," said Corso, "but he looked like an evil German scientist. We were worried that it looked too scary. So Jim came up with a character that was more of a swashbuckling, very boisterous Italian — very 'Antonio Banderas,' with long dark hair and a pencil mustache. But then they hired Billy Connolly, who is boisterous and has a big personality, to play Uncle Monty — and that character was a bit like what Jim was doing for Stephano. So he and Brad thought maybe that wasn't the way to go, and we started from scratch — only a week before we started shooting."

Back at the makeup trailer, Corso and Carrey began with the basic Count Olaf makeup. "We started with the Olaf brow ridge and nose," recalled Corso. "Brad decided that the nose was such a defining look for Olaf, we would keep that in all of the disguises as the one unifying element. Then we said, 'Okay, here's Count Olaf, and we know what he looks like — what would he do to disguise himself?' We came up with something very simple: sleeking his 'Olaf' hair into a bad comb-over, darkening it, then shaving off his sideburns and eyebrows. We kept a little bit of a mustache, and we put glasses on him. When we got all of this stuff on him, Jim instantly became this character and started talking in a funny voice and improvising. This character just came out of thin air."

After the demise of Uncle Monty at the hands of Stephano/Count Olaf, the children are delivered to the home of Aunt Josephine (Meryl Streep), a structure that clings precariously to the side of a cliff overlooking a lake. Production built sets for the lakeside sequence in a water tank at the Downey facility. "There wasn't an existing tank that had enough surface area," said Fangmeier, "so the production built this one — and I think it's now the biggest indoor tank in North America. They constructed a beautiful forced-perspective village set right there on the tank. Briny Beach was also there. They subdivided the tank and put in different backings, the beach on one side, and the village with the dock area on the other side."

It is in the village that Josephine and the children meet 'Captain Sham,' Olaf's final disguise. "He's a crusty old sea captain," observed Corso. "Jim found a picture in all the research we'd done of an old sailor from Newfoundland, who had a little white beard and big Wilford Brimley eyebrows — and Jim said, 'That's him!'" A bit of sunburnt look to the skin and a week's worth of hair growth, bleached white, completed the character.

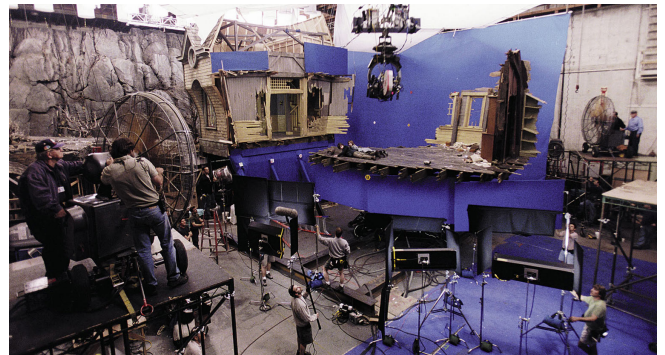


CG supervisor Philippe Rebours checks out a stage setup of a cliff-face model carved out of urethane foam. The miniature cliff set was used for a sequence in which Aunt Josephine's house blows apart and tumbles from its clifftop perch in a hurricane. In addition to being used for the cliff-face element itself, the model was laser-scanned and duplicated in the computer to create 3D models of surrounding cliffs on the lake, which allowed Brad Silberling complete freedom in moving his camera through the environment. Still photographs of the model provided textures for the CG terrain.

In addition to the village, the Downey sets included the entryway to Aunt Josephine's house, and a small section of cliff surrounding it. ILM extended the sets and painted backings for wide views, using miniatures as the basis for the synthetic house and cliff. "Rick Heinrichs and his team had built a pretty accurate maquette of the house," said Steve Gawley. "They shipped that up to us, and that's what we actually built from. We took measurements off the maquette, and input those into the computer, so we could cut out components using our laser cutter. The maquette was 1/48 scale, and we ended up building it at 1/8 scale, mainly out of redwood." CG crews photographed stills of the house miniature, which were then photo-mapped onto a digital version. "The house had to be put up on a cliff far away, and for us to do that with this large a model would have been impractical. It was better to do that as a CG thing." The model shop built the supporting scaffolding beneath the house, as well, which was also photographed and applied to digital geometry.

Shortly after the children's arrival at Aunt Josephine's, the house is destroyed in a hurricane. Full-size house interiors had been constructed atop a gimbal so that they could be made to shake and roll with the force of the storm. As the hurricane advances, parts of the house break away and fall down the cliff. "The library is the first part to break away," said Fangmeier, "and that was completely CG. We had to do a huge rigid body simulation to get books and chairs and everything flying around the room. Just as we had done for the house exteriors, we took a lot of photos of the interior of the full-scale set to give us texture maps for our interior shots."

The library drops away as the kids run into another room, a sequence that was realized by shooting the child actors against bluescreen, then compositing the falling CG library into the background. When that second room, too, blows away in the wind, the children are left standing on a small platform atop the pilings — all that remains of the house. "The set for this was basically a platform," said CG supervisor Philippe Rebours, "shot bluescreen." That bluescreen element provided the starting point for a very long pullback. "They pulled back on the bluescreen," said Marshall Krasser, "but, of course, they couldn't pull back as far as we are pulling back in the shot. So we used that bluescreen as far as we could, and then basically flew that 2D element spatially through our 3D environment. We did a set extension to the right of it, extending the cliffs, with the stormy seas below." Jay Cooper was compositing supervisor for the hurricane sequence.



For shots of one room after another shearing away in the gale-force winds — leaving the children stranded atop a swaying platform — Brad Silberling and his production crew photographed the child actors against bluescreen, on partial house sets. Full-size house interiors were constructed atop a gimbal so that they could be made to shake, rattle and roll with the force of the storm.

The model shop built a urethane foam section of cliff face at 1/24 scale. "The skilled hands of Lorne Peterson wielding a big machete knife led the way on that," noted Gawley. "Lorne has become the Machete King here at ILM. He is excellent at carving organic shapes — like stone and things like that — out of urethane foam. In this case, the sculpt imitated a slate-like texture.

It was approximately 14 feet tall, and about 24 feet long at the base. Lorne, Carl Assmus, Richard Miller and their crew sculpted and painted this big cliff face in about two and a half weeks. We had to do it quickly because it had to appear in a trailer that was coming out shortly thereafter. In addition to being used for the cliff face element itself, this model was used to put texture mapping on the surrounding cliffs on the lake.”

“We laser-scanned that portion of the cliff,” added Rebours, “and also took plenty of photos of it and used those to apply the texture. We were able to use that model by duplicating it and cutting it, et cetera, to give us enough cliff for all the shots. We also had some still camera shots. In those cases, we took one photo of the miniature, and if we could just use that, we used that. But for the moving camera shots, like the big pullback, we had to apply the miniature textures to a 3D version of the cliff. That allowed us to do whatever movement Brad wanted on it.” As the shot continues to pull back, the village enters frame in the background. To accommodate the move, the village stage set was re-created digitally, with a matte painting serving as the far background. The platform the children stood on against bluescreen also had to be re-created to accommodate a change in the camera movement. “We had to re-create it in CG so we could change the perspective slightly from the movement they had shot on the bluescreen stage. On the set, it is very difficult to get the speed that you want, and we had to get our move to link up to the move they did on that set. For all these reasons, it was easier to replace the original platform to get the changing camera speed and perspectives.” Stormy CG lake water that could be seen at the bottom of the cliff was created through shaders and geometry.

A down-shot at the end of the pullback reveals the house structure breaking apart as it tumbles down the cliffside and into the water. ILM crews dropped breakaway house miniatures from a height of 40 feet, filming three takes. “We did some tests for that,” stated Steve Gawley, “then gave the miniatures to Geoff Heron and his effects crew, who rigged them to break apart on the way down. We were up very high on three big Condor cranes, and we shot them falling high-speed.” Separately, ILM shot house-shaped objects dropping into a 40-by-40-foot pool to capture water interaction of the house falling into the lake.

The resourceful children make their way off the swaying platform, back onto solid ground, then commandeer a sailboat to go in search of the now missing Aunt Josephine. Live-action for the scene was shot in the middle of the water tank in Downey. “That portion had a very dramatically lit backing, with golden sky and everything,” said Stefen Fangmeier. “But, of course, it looked like a painted backing and a tank. There was also a horizon painted into the backing — but with



ILM integrated the bluescreen set elements with a 3D environment made up of the cliff-face set and CG stormy waters below, created through geometry and shaders. In post, the stage platform shot against bluescreen had to be re-created digitally to accommodate a change in camera movement. Final shots in the sequence, in which the house tumbles down the cliff and into the lake, made use of breakaway house miniatures dropped from a crane.

different camera angles and everything, it didn't work. So we had to extend all of that and create a new horizon and background."

"You could see where the tank water stopped and the painting began," added Marshall Krasser. "So we did some CG water to transition across that area and give it the feeling of live water going out to the horizon." Compositing sequence supervisor Tia Marshall finessed tank shots for this and the following scene in which the boat is attacked by giant leeches — seen initially only as ripples in the surface of the lake water. ILM created 30 shots for the leech attack, building upon some practical rippling water effects that had been executed live, in the tank, and replacing practical leeches that had been designed and built by the production prop department. "The practical stuff wasn't exciting enough," commented Fangmeier, "and it didn't look like enough leeches. So we replaced a lot of the water, creating CG water with ripples in it to make it look as if hundreds of leeches were there. Interestingly, when you are shooting in a tank, the water looks extremely CG; so it wasn't that hard to match that water."

ILM animated its CG leeches, implementing a real-time physical simulation simultaneously. "As we were animating the overall movement of these leeches," related Colin Brady, "the simulation would make their tails wiggle and overlap as they were whipping around. Instead of the animator doing his animation and handing it off to a technical person to put all the overlap physical simulation stuff, we had that built into the program in real time; so the animator got all of that for free, instantly. That was the first time we'd done that."

The children are 'rescued' by Olaf and taken, protesting, back to his house. Once there, he stages a play that is, in reality, a marriage ceremony, convincing Violet to marry him by holding Sunny hostage in a cage dangling from a house-top tower, rigged to drop if Violet refuses him. Live-action for the marriage sequence, and a subsequent scene in which Sunny escapes the cage, had been shot on the full-scale Olaf house and yard set on stage at Paramount; but, again, ILM tracked in the top-level portions, created from the house miniature. "All of the skies were created, as well," said Jeff Olson, "because they were shooting off the top of the stage at Paramount. The entire environment was a very big 2D composite, with miniatures and matte paintings. Marshall Krasser took the lead in putting all those pieces together."

Compositors also finessed a shot of Count Olaf entering on wires in the course of the wedding scene. "They actually had him on wires on the set," commented Krasser, "but the wires didn't look funny enough. This was supposed to be a cheesy Count Olaf production, and these wires just weren't cheesy enough. So we ended up shooting bigger, thicker rope, and we put those over the existing wires. It was kind of weird for us to actually have to add thick wires to a shot!"

Sunny escapes, Olaf's marriage scheme is dashed, and the kids return to the remains of Baudelaire Mansion with a better understanding of the circumstances surrounding their parents' deaths. Via the power of their imaginations, the house returns to its pristine and happy state. "The camera pans around the children," Stefen Fangmeier related, "following them up the stairs, coming around and seeing their reaction to the house transforming right before their eyes. So there were two live sets — one was the pristine house set and the other was the ruined house set — and we shot them both motion control. It was difficult to get them to line up,

because we weren't just shooting passes on the same set; we had to actually move the motion control tracks and everything from the ruins set to the pristine set."

For the actual transformation from one set to the next, ILM attempted a look that was more three-dimensional and organic than a simple cross-dissolve. "We wanted it to look like there was invisible fire eating away at the house and burning it," said Fangmeier, "reducing its volume in a very interesting, three-dimensional way. It is almost as if you are watching the house burn away in time-lapse. We used a particle approach, but with a heavy-duty RenderMan shader. It's a very magical shot, but it required a lot of R&D."

"This was such a challenging, unique shot," added Gerald Gutschmidt, "we worked on it up to the last minute. It started off with an ultra-precise matchmove set. We did Maya simulations on that, so instead of a traveling matte or 2D mattes, we had an actual 3D reveal happening. It is literally as if an arsonist had gone around and burnt the set in several places. So we have places where the fire crawls up along the wall, but in a very natural way. The camera is moving and the lighting is changing throughout the shot, from the ideal pristine lighting to the burned ruins look." Ultimately, Brad Silberling simplified the shot somewhat. The transition was still based on very precise matchmoved and photo-modeled geometry, but it used a dozen lights with a special flicker noise shader to produce 3D mattes. The transition was processed further in the composite, enhanced with 2D displacement effects and 3D particle dissolves.

As Lemony Snicket warns throughout the film, the story does not end on a 'happily-ever-after' note; but, instead, on a note of ambiguity as the Baudelaire children face their uncertain future. "What's great about these books, and this movie," concluded Jeff Olson, "is that, unlike most children's books, they have a dark feeling to them. Things don't always work out so well. Daniel Handler has quite a dark and wry sense of humor, and that really comes out in this movie. Lemony Snicket is like 'Harry Potter meets Edgar Allan Poe.'"

The film's dark and subtle tone was sustained in the effects, many of which were virtually invisible to the audience. In that way, Lemony Snicket's *A Series of Unfortunate Events* recalls a more classic type of effects movie — one in which the effects do not call attention to themselves, but are there only to further the story. "For this show," commented Colin Brady, "we had to make our effects — especially the Sunny animation effects — as invisible as possible. That was the true challenge. We'll know we did our job right if everybody who sees this movie just thinks Brad Silberling found the best acting baby in the world!"

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